

*International Workshop on the Trade in Coral Reef Species: Development of International  
Guidelines for Environmentally Friendly Coral Mariculture*

NOAA Coral Reef Conservation Program  
The Ocean Foundation  
Yayasan Alam Indonesia Lestari (LINI)

## **Background**

Since the late 1980's, the trade in stony corals has increased by 300% with around one million corals in trade each year. Most live coral is currently exported from Indonesia, followed by Fiji, Vietnam and several other South Pacific island nations (Rhyne et al. 2012). In 2004, over one million live corals were harvested from the wild for the aquarium trade (and over 2000 tons of live rock as well as 100's of tons of corals that are killed and bleached for the curio trade, Rhyne et al. 2012). The United States is the world's largest consumer, buying more than 80% of corals and other reef invertebrates. However, commercial extraction of coral is banned in the United States. Although the volume continues to increase, much of this is through mariculture (Rhyne and Tlusty 2012). Many of the branching corals are now being propagated from fragments on farms in developing countries, as well as land based farms in the United States and Europe and in hobbyist aquaria. The growth of maricultured corals is noticeable in Indonesia which has established an annual quota of about 500,000 pieces. This will help preserve extant coral reefs as it will significantly reduce the removal of corals from the wild.

## **Workshop Overview**

The primary intent of the *International Workshop on the Trade in Coral Reef Species: Development of International Guidelines for Environmentally Friendly Coral Mariculture* was to better understand the mariculture of stony corals and the means to reduce the reliance on wild harvested corals for use in trade. The workshop also provided a forum for the National Oceanic and Atmospheric Administration, Coral Reef Conservation Program to continue initiatives to address unsustainable and destructive trade in coral reef species. The workshop was held in Bali, Indonesia on July 12- 15, 2011 and was attended by 44 participants<sup>1</sup>, including key stakeholders (government, industry, academia, and non-governmental organizations) from exporting nations (Indonesia, Malaysia, and Papua New Guinea), potential exporting nations (Philippines and Timor Leste), and importing countries (Canada, United Kingdom, and United States). See appendix 1 for a list of meeting participants.

The workshop participants were asked to develop guidelines for the three fundamental components of operating an ornamental coral mariculture operation: (1) Criteria for selecting and collecting corals to be cultured; (2) Methods and criteria for propagating and growing out the cultured corals; (3) Practices for the handling and packaging of the cultured corals during export. The workshop<sup>2</sup> began with a plenary talk to set the stage, which described the current state of stony coral trade and some of the environmental issues. This was followed by country report<sup>3</sup>, in which workshop participants describe the status of stony coral exports and mariculture industry and guidelines. After the completion of the country reports, a series of talks were given on stony coral mariculture, market trends, restoration, and monitoring. For the remaining workshop participants broke into two working groups to develop sustainable/environmentally friendly guidelines both for mariculture as well as the export of stony corals. The workshop also provided

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<sup>1</sup> Appendix 1 – List of workshop participants

<sup>2</sup> Appendix 2 – Workshop Agenda

<sup>3</sup> Appendix 3 – Country Reports

hands on training of stony coral propagation and provided an opportunity for participants to examine in situ coral mariculture sites and an indoor closed-system mariculture facility.

The workshop participants broke into two groups and discussed issues related to mariculture and export of stony corals (full reports are below). The workshop participants felt that due to current guidelines on for selecting and collecting corals for mariculture were acceptable and that there was no need to discuss this component at the workshop. Indonesian participants indicated that it is common practice to select a mother colony and use second generation fragments to grow for trade. Additionally, most participants felt that most of the current guidelines for culturing were adequate, but there were potential gaps that could be addressed and that the International Air Transport Association regulations for shipping live corals were sufficient because there is little mortality of corals associated with direct shipping. Recommendations from the working group include:

1. Provide guidance for restoration/restocking of wild population with maricultured corals. Some of the current guidelines require that the coral farmers use a portion of their cultured fragments to restock wild populations or restore coral reefs. The guidelines, however, include little to no information on procedures to conduct restoration.
2. Create a web accessible centralized database that contains a list of source of countries' stricter measures. This could potentially be housed on the CITES website.
3. Improved technical guidance on marking or tagging mariculture corals so that farmers could use the most cost effective methods.
4. Marketing (branding or ecolabel) of sustainably cultured corals to create cost incentive so growers will participate in the program
5. Identification guide to coral pest to improve the quality of corals being exported.
6. Improving the quality of coral nursery areas to enhance the recruitment of natural predators for coral pests, maintain surrounding/nearby habitat quality (seagrass beds, coral reefs, etc.).
7. Develop guidelines for culturing large polyp and mobile species.

### **Working Group Reports**

#### **Working Group: Stony Coral Mariculture, Facilitator - Andrew Rhyne**

The working group was asked to consider:

1. What are the best and most appropriate methods of asexually propagating corals for a commercial mariculture operation;
2. What are the best and most appropriate methods for mounting the newly propagated corals;
3. What types of production systems are in use;
4. What are the best and most appropriate methods for the design, construction and placement of the grow-out racks; and

5. Once they have been fully grown-out, what is the optimum ratio of colonies to export to consumers, colonies to re-propagate for grow-out, and colonies to replant back on to the reef as restoration?

The working group's initial conversation was related to the tasks the group was asked to consider; however, it was decided that many of the participating countries had guidelines in place or have developed draft guidelines. Therefore, the group decided to take look at these current guidelines to determine any potential gaps within them.

Countries with guidelines are Indonesia, Papua New Guinea, Malaysia, and the Philippines. At the time of the workshop each of the countries were at a different stage of implementing their guidelines. The Indonesia stony coral mariculture guidelines are currently in use by the industry and have been in place since 2008. Papua New Guinea guidelines were drafted by an outside partner, SEASmart, but have not been implemented by the government. Malaysia's guidelines were also in draft form, and were under review by the government. The Philippines have declared it illegal for anyone to export corals, live specimens or products. However, there has been some interest in allowing mariculture of corals for export and draft guidelines have been developed, but not approved for use and it is unknown if they will be approved.

## **Indonesia**

The guidelines developed by Indonesian Government for stony coral mariculture are fairly comprehensive with clear rules and expectations. In general, the guidelines include information about the mariculture of stony coral, which include site selection for *in situ* mariculture, collection of mother (seed) colonies, type of base for fragments, attachment of fragments coral to tables or substrate, tagging of coral, harvest, and transportation to export or holding facilities. Coral farmers are allowed to culture a select coral species with a quota limit as directed by the General Director of Forest and Protection and Natural Conservation. Coral farmers can submit a proposal to expand the list for additional species approved for mariculture. Indonesia requires the farmers to submit an annual report that includes: 1) The species and total number of coral transplanted (main seed and offspring); 2) Death rate; 3) Hindrances faced; 4) Plantation of new species (if available); and 5) Production estimation that will be traded for the following year. The Indonesia Government requires farmers to use a portion of the cultured fragment for restocking of wild population (restoration); however, there is no information on how to meet this requirement (a topic to be addressed in the 2<sup>nd</sup> workshop).

The group identified potential concerns with the Indonesian guidelines. First, while the tagging/labeling guides are clear and allow for tracing of corals that are maricultured, farmers indicated that are time consuming to attach and remove and costly to use. There were also concerns that the guidelines are restrictive in the species are allowed to be cultured and exported due to the requirements for the base construction and attachment to tables. The group felt that the guidelines are constructed for fast growing, branching species, and free living species cannot be farmed under current guidelines.

## **Papua New Guinea**

Papua New Guinea (PNG) guidelines, Mariculture, Aquaculture, and Restoration Manual – SEASmart Program, allow for a non-government partner in conjunction with the government implement all aspects of stony coral mariculture in partnership with coastal villages. The PNG guidelines are detailed and include specific information about where corals can be maricultured, how the platform is to be constructed, the collection of brood corals, the methods for culturing corals, traceability and tagging of maricultured coral, coral farmer safety, and clean up. The Guidelines only allow for SEASmart or an external organization to collect brood stock (mother colony, only half of a colony is taken from a wild specimen). The brood stock would be labeled and traceable back to the collection site in the wild. All specimens to be exported would be brought to a SEASmart exporting facility to be held in a closed system before shipment. The guidelines also require that 30% of maricultured coral fragment be used for restoration to enhance and recover coral reef habitat and to increase awareness and education on the importance of corals. However, as with the Indonesian coral mariculture guidelines they do not include specific details for doing coral restoration.

While the PNG guidelines are detailed in the implementation and management of mariculture systems, they do not seem to include an export quota. The specific details seem to restrict creativity solutions which may potentially reduce a farmer's ability to problem-solve.

## **Malaysia**

Malaysia also has draft guidelines for stony coral mariculture. These guidelines were developed by a consultant, David Palmer, a long time coral farmer in the Solomon Islands. Malaysia's guidelines are restrictive and only provide for one commercial company to do stony coral mariculture. With this barrier for entry in place, it is unlikely that mariculture activities will expand in the Malaysia.

## **Philippines**

While the Philippine government does not all for export of stony corals from the county, the government drafted coral mariculture legislation and guidance for consideration. The document is a comprehensive draft for coral farming and trade oversight. The Philippines draft guidelines are similar to Indonesia's guidelines; however, it includes well defined draft of methods and terminology, coral resources conservation measures, trade and traceability measures, and the need for an aquatic wildlife farm permit (coral aquaculture).

### Working group: Mariculture, Facilitator - Andy Rhyne

Overall concerns and gaps with current manuals/guidelines as identified by the working group:

1. Base construction – The working group discussed the type of bases, the cost, and need for making the coloration of the base look more natural (i.e. like coralline algae).

2. Limitation to species that can be cultured - Some of the guidelines included restrictions including:
  - a. Barriers to culture of new species such as culturing the free living, mobile species. Issues related to culturing free living species were how to 'cage' or keep the mobile species from wondering off and how to tag them. One option discussed was using coded wire tags that are inserted into the skeleton. The group also discussed how to maximize space and whether or not mobile species can be cultured under tables on which non-mobile species are being cultured. There was also discussion developing a sand box type structure with shifting levels to rear mobile corals.
  - b. Restrictions on platform construction – limits how a coral farmer can grow corals. The group talked about some of the other methods for growing corals such on ropes or floating platforms, which are currently used in the Philippines for culturing corals for restoration.
3. Barriers to entry for new coral farms – Guidelines that include limited entry have some good qualities, easier to control, but could also impact the livelihoods of coastal populations.
4. Coral pests – The control of pest on coral fragments improves the quality of the exported corals. The group discussed the identification, prevention, and treatment of some of the pests that are commonly founds on corals in the aquarium trade. These included:
  - a. Red bugs
  - b. Nudibranches
  - c. Flatworms
  - d. Sundial snails
  - e. Acropora eating crabs

It was determined that an identification manual that included information how to identify coral pest at the *in situ* farms and in the export facilities would be useful. The guide should include species identification, how to identify typical damage, prevention/control methods, and describe what the pests' eggs look like. The identification guide should also identify any natural predators and it was noted that healthy coral areas around mariculture facilities could promote the availability of natural predators. It was suggested that the areas around the mariculture racks could be restored to facilitate the recruitment of natural predators. Additionally, coral farmers could manually remove infected piece and treat the pieces for the pest. Arrangement of corals similar to mixed gardens (mix of coral species) could also reduce the amount of pests on the fragments.

5. Need for guidelines for land based facilities – This included land-based mariculture facilities and pre-shipment facilities. There seems to be little guidance on handling corals moving from *in situ* culture to export facilities. Ways to keep coral stable while moving them from near to on shore – basket with compartments similar to a beer bottle box or a rack to secure the fragments to reduce breakage or mortality. The group felt it was not

good to package the corals on the beach, but have a holding facility where the corals can rest for 2-3 days before shipping overseas. Lighting conditions and stress from poor water quality can cause corals to become stressed and loose coloration. When using a holding facility that is outdoor (near the beach), farmers can use an 80% shade cloth to control the light and ensure good water quality (protein skimmers, pH, calcium, etc.) by doing water changes.

6. Quality control of surrounding areas – The group discussed maintaining a healthy habitat around mariculture areas to support clean water and promote the utilization of beneficial fish (remove pests, as mentioned above). This included develop paths to/from culture area so not to impact surrounding habitat whether it be coral or sea grass and remove trash (old baskets, dilapidate racks, and olds coral bases).
7. Restoration efforts and methods – While two of the guidelines require farmers to hold back a portion of the fragments for restoration or restocking of corals, the documents do not provide any direction on how to do the restoration or restocking. The working group participants did not feel that it was necessary for the mariculture guidelines to include a restoration component, but if the guidelines required restoration, they should include a clear purpose for restoration, describe the methods, and any potential monitoring of the restored sites.

#### Working Group: Export, Facilitator – Vin Fleming

##### **Tasks**

The working group was asked to consider:

1. What are the best practices for handling cultured corals and preparing them for export;
2. What are the best and most appropriate methods for packaging cultured corals for safe transport;
3. What are the permitting and reporting requirements for exporting cultured coral colonies; and
4. What can be done to distinguish and promote the consumption of cultured corals over harvested wild colonies?

In doing so, the group sought to determine what guidance was available at the moment and thus what gaps for guidance existed, sought to identify barriers to implementation of guidance and any future needs. Issues were considered and slightly different categories, including how CITES impacts regulations, indentifying corals, branding / labelling, and handling / shipping issues..

This discussion focused on Indonesia, as this group has a range of experience from the Indonesian producers who had been exporting corals for many years. Producers from other countries were currently exporting relatively few corals, (or were not exporting corals at all but may permit the export of mariculture specimens in future), and thus had less extensive experience.

## Regulation

The Indonesian Regulations for the mariculture of corals were seen as a good example of readily available guidance which addressed many of the key issues associated with coral mariculture (e.g. how to get brood stock, the species that can be maricultured, estimates of annual production and audits of production). Indonesian producers were largely happy with the guidance though were concerned at the business costs this imposed (see below).

It was agreed that the Indonesian Regulations provided a good basis for guidance to others and, subject to the views of the Indonesian government, should be made available for other countries to modify to suit their own domestic circumstances.

Under the Indonesian Regulations a proportion (10%) of maricultured corals have to be returned to the wild yet no procedural guidance on this is provided; most corals are returned to the wild as close to the production facility as possible – in order to save costs. Guidance on best practice on return of specimens (if this is considered necessary) to the wild is desirable.

A number of issues arose with respect to CITES. Foremost amongst these was the use of the correct source code for maricultured corals.

The group recognised that under the present definitions in Res. Conf. 10.16, coral mariculture specimens could never qualify as genuinely captive bred - **source code C** (which includes asexual reproduction) under CITES because captive breeding had to take place in a ‘controlled environment’. This is defined as having ‘*boundaries designed to prevent animals, eggs or gametes of the species from entering or leaving the controlled environment*’. Clearly, it is not possible in mariculture to prevent coral gametes entering or leaving a seabed facility.

Accordingly, the correct source code that should be used is **source code F** – specimens ‘born’ in captivity but which do not meet in full the definition of captive breeding.

By contrast, coral fragmentation in land-based facilities or home aquaria could meet the definition of captive bred corals.

The collection of gametes from spawning corals for rearing in captivity could fit under the CITES definition of ranching (**source code R**): ‘*the rearing in a controlled environment of animals taken as eggs or juveniles from the wild, where they would otherwise have had a very low probability of surviving to adulthood*’ but again would not qualify as ranching if specimens were not reared in a controlled environment.

By contrast, the artificial propagation of plants (**source code A**), the botanical equivalent in CITES of captive breeding, only requires that plants are raised in ‘controlled conditions’ with a less strict definition. The group did not conclude any need for change to CITES definitions - but a proposal to a future CITES CoP for an amendment to the definition of ‘controlled environment’ (to account for the different biology of aquatic invertebrates, such as clams and corals, and fish) would broaden the range of source codes that might be applied.

Other CITES issues raised included the difficulties of shipments being seized because of technical errors with the paperwork, the difficulties caused by different countries having stricter measures or different times to process permits, and EC import suspensions on corals. None of these issues are specific to mariculture specimens but it was felt that, through the CITES Secretariat, a centralised and accessible source of countries' stricter measures would be desirable.

On EC import suspensions, it was suggested that the EC is open to changing its opinions if presented with suitable scientific evidence – this might be achieved by seeking to use Universities in Indonesia or elsewhere to undertake and publish suitable studies of coral abundance and rates of off-take.

### **Marking**

Indonesian regulations for mariculture require each individual specimen to be tagged – the information on each tag includes a species code, a company code, the asexual generation (F1 etc.), the month and year of propagation, and a unique specimen identifier in a sequence defined by the Management Authority.

There is no specification of the kind of label that must be used other than it has to be permanent and has to be attached to the base of a propagated specimen. The stated purpose of tagging is to enable control and monitoring of maricultured specimens and to enable them to be distinguished from wild-taken corals.

It is Indonesian practice to remove the tags before export. It is also clear that there are different perceptions of the value of such tags between the exporters/producers and those in importing countries involved in the trade (or its regulation).

Producers consider the tagging, and associated paperwork, to be a regulatory burden with significant costs in the materials and time taken to label specimens (and then remove them before export) but with few benefits to producers. As maricultured corals are easily recognised by their appearance, why is it necessary to have to tag specimens also?

By contrast, importing countries perceived these tags to have considerable benefits because they provided better evidence of specimens being genuinely maricultured (rather than F0 specimens grown on artificial bases) – as such they would make products more marketable to ethical consumers who may want to know their purchased corals were from a more benign production method than wild collection and who were also interested in the source, sustainability and history of their specimens. The labels also provided evidence of maricultured origin to regulatory authorities in importing countries where wild specimens of the same species may be subject to import suspensions

In discussion, it was clear that individual producers use a range of different labels with no standardisation of materials between producers (some standardisation may be desirable, e.g. for branding, and also for cost savings through collective purchases of material). There may also be other novel marking methods which could be explored which might provide more cost-effective marking solutions.

It was agreed that technical guidance on marking methods, including novel techniques, would be desirable so that producers could use the most cost-effective materials.

It was also felt it would be desirable for exporters to check with their customers as to whether they wanted to see tags retained on specimens for the reasons above – namely identifying specimens from a known, maricultured source. However, it was also clear that neither exporters nor importers wished to see their businesses identified (even by codes) on tags for reasons of commercial confidentiality.

Exporters felt that there was too much pressure on the traceability of maricultured corals. These were more heavily regulated and reported on than wild corals even though this was a more benign production system and was a conservation measure. However, it was also felt that if tagging was required anyway by Indonesian regulations, then it may be desirable to make the best use of tags, perhaps to support branding (see below).

### **Marketing/Branding**

Little consideration had been given to ‘branding’ maricultured corals with exporters seeing this as primarily the responsibility of the importer. The importer is closer to the final customer and can keep the exporters informed of customer needs and interact with customers through internet forums.

It was agreed that if branding was to be pursued, then this might best be done (in Indonesia) by using AKKII as a brand. The AKKII logo might be used on the tags for mariculture corals or on the bases, subject to consideration within AKKII itself. Such an approach could make Indonesian/AKKII corals readily identifiable to consumers. However, this would also require a standardised approach between AKKII members which could then also lead to economies of scale through collective/cooperative purchasing.

Countries new to exporting corals (wild or maricultured) might also wish to consider how they, or their producers, might also possibly want to brand their corals (a topic further discussed in the 2<sup>nd</sup> workshop).

### **Handling/Shipping**

Neither exporters nor importers felt that there was a need for guidance additional to the IATA guidelines for shipping live corals, of whatever source (wild or mariculture). This was a long-established practice with minimal mortality recorded in transit.

However, the group agreed that practices pre-shipment probably had a higher impact on coral mortality than when actually in transit. Onward trans-shipping after export probably also represented a greater risk of mortality to corals than the initial export flight. The key issue to resolve here was good coordination between the exporter and importer to use the correct flights to achieve shortest journey / waiting times. Both these factors (pre-shipment and flight times) affected corals of both wild and maricultured origin but an importers perspective was that maricultured specimens may be more resilient to stresses associated with transport.

The risk of exporting disease in shipments of corals was not considered to be a major issue by the group. However, the risk of including other unwanted organisms was a significant risk that needed to be addressed. It was recognised that tighter controls in exporting and importing countries to reduce such risks were likely in future with implications for the trade.

### **Other issues**

There was evidence that non-AKKII members were producing mariculture corals without proper licences and then smuggling these abroad by concealing the corals in boxes containing live fish. Having tags on mariculture corals might then be a deterrent to unauthorised producers but tags might also be counterfeited or legitimate specimens might be stolen from licensed marine facilities. Any illegal trade undermines the legitimate exporter and importer and hurts everybody – brand identity could be a real assistance in this issue.

### **Acknowledgements**

The workshop was funded by the NOAA Coral Reef Conservation Program with support from the National Marine Fisheries Service International Affairs Office, which was in response to outcomes from the 2001 International Workshop on the Trade in Stony Corals (Jakarta, Indonesia). The workshop would not have taken place without the efforts of Jeremy Linneman of the Ocean Foundation for assisting to assist in the organization of the workshop and making sure it ran smoothly and Gayatri Reksodihardjo-Lilley of the Yayasan Alam Indonesia Lestari (LINI - The Indonesian Nature Foundation), who assisted with on the ground logistics for the coral propagation demonstrations and the field trip. I would also like to thank the members of the Indonesian Coral, Shell, and Ornamental Fish Association (AKKII, Asosiasi Koral, Kerand dan Ikan Hias Indonesia) for participating in the workshop, providing corals for propagation demonstration, and allowing the workshop participants to visit the maricultlure sites and facilities. I am additional grateful to the efforts of the working group chairs, Andrew Rhyne and Vin Fleming, to Steven Pro for providing the demonstration on coral propagation, and to workshop speakers.

## Appendix 1- List of Workshop Attendees

<b>Liz Fairey</b>	USA	Gov	National Oceanic Atmospheric Administration
<b>Jeremy Linneman</b>	USA	NGO	The Ocean Foundation
<b>Andy Rhyne</b>	USA	NGO	Roger Williams University Marine Aquarium Association
<b>Steven Pro</b>	USA	NGO	North America
<b>Nicole Ross</b>	USA	NGO	The Ocean Foundation
<b>Mark Schreffler</b>	PNG	Bus	Sea2Sea Consultancy
<b>Vin Fleming</b>	UK	Gov	JNCC
<b>Edward Gomez</b>	Phil	NGO	University of the Philippines
<b>Patrick Foster</b>	Canada	Bus	ReefWholesale.com
<b>Rachel Rabi</b>	PNG	Gov	Fisheries
<b>Ludivina Labe</b>	Phil	Gov	Department of Fisheries
<b>Watie Ambu</b>	Malaysia	Bus	ICSB-Sabah
<b>Daud Awang</b>	Malaysia	Gov	Fisheries
<b>David Vosseler</b>	USA	NGO	SEASMART
<b>Mr. Hadi Wijaya</b>	Indo	Bus	Trisentosa Intrabuana Niaga, PT
<b>Mr. Wesen D Wirawan</b>	Indo	Bus	Golden Marindo Persada, PT
<b>Mr. Djohan Tjiptadi</b>	Indo	Bus	Cahaya Baru, CV
<b>Mr. Suryo</b>	Indo	NGO	AKKII
<b>Mr. Indra Wijaya</b>	Indo	NGO	AKKII
<b>Mr Susanto Herlambang</b>	Indo	Bus	Aneka Tirta Surya, PT
<b>Ms. Katrina Herlambang</b>	Indo	Student	
<b>Julio da Cruz</b>	Timore Leste	Gov	Fisheries
<b>Mr. Agus Hudiono</b>	Indo	Bus	Panca Naga Jaya, CV
<b>Mr. Agung Setiabudi</b>	Indo	Bus	Agung Aquatic Marine, PT
<b>Mr. Deddy Mulyadi</b>	Indo	Bus	Aqua Marindo, CV
<b>Mr Sudibyo</b>	Indo	Bus	Aristocratama Binausaha, PT
<b>Mr Dwi Atmaji</b>	Indo	Bus	Banyu Biru Sentosa, PT
<b>Alexander Hadi Prawira</b>	Indo	Bus	Bekael, PT
<b>Mr. T. Rishad</b>	Indo	Bus	Gloria Internasional, PT
<b>Mr. Johannes Wijaya</b>	Indo	Bus	Inti Samudra Lestari, PT
<b>Mrs. Yuni Yarman</b>	Indo	Bus	Kharisma Surya Lestari, PT
<b>Mr. Tony Hartono</b>	Indo	Bus	Pasific Anekamina, PT
<b>Mr. Frans Ludoni,</b>	Indo	Bus	Panorama Alam Tropika, PT
<b>Mr. Sukandi</b>	Indo	Bus	Sangputra Wimasjaya, PT
<b>Mr. Lie Thay Hyan</b>	Indo	Bus	Vivaria Marine, PT
<b>Mrs. Harijati</b>	Indo	Bus	Fantasi Aquarium, CV

<b>Mr. Teguh Wijaya</b>	Indo	Bus	Indo Pisces, PT
<b>Mr. Wisnu Tirta S</b>	Indo	Bus	Poros Utama Nusantara, PT
<b>Mrs. Nieniek Hanoppo</b>	Indo	Bus	Nini Sri Rejeki, PT
<b>Mr. Jimmy Susanto</b>	Indo	Bus	Sarana Teknik, PT
<b>Mr. Eddy Wahyuono</b>	Indo	Bus	Dinar Darum Lestari, PT
<b>Mr. Abdul Raji</b>	Indo	Bus	Segoro Utomo, UD
<b>I Made Putra Manawa</b>	Indo	Bus	Bali Aquarium, PT
<b>Mrs. Sian Sugianto</b>	Indo	Bus	Blue Star, PT
<b>Gayatri Lilly</b>	Indo	NGO	LINI
<b>Raja</b>	Indo	Bus	Raging Reef
<b>Trina Parsons</b>	Canada	Bus	ReefWholesale.com Vibrant Underwater
<b>Jerald Perera</b>	Sri Lanka	Bus	World/Exotic Marine
<b>Selma Pamolak</b>	PNG	Gov	Fisheries
<b>Silvia Timotius</b>	Indo	NGO	TERANGI
<b>Yunaldi</b>			
<b>Kelvin Brian Lee</b>			
<b>Mr. Surya Wiranwan</b>			
<b>Kartika D. Yarmanti</b>			

## Appendix II - Agenda

### *International Workshop on the Trade in Coral Reef Species: Development of International Guidelines for Environmentally Friendly Stony Coral Mariculture*

July 12, 2011 – July 15, 2011

8:30-5:30

Holiday Inn

Bali, Indonesia

**Purpose:** To develop guidelines for in collecting, culturing, and exporting stony corals, provide training in coral propagation and identify existing production systems for coral mariculture.

### **Monday, July 11, 2011**

7:00 PM	<b>Meet and Greet Dinner</b> Holiday Inn
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### **Day 1 – Tuesday, July 12, 2011**

8:30 AM	<b>Registration</b>
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9:00 AM	<b>Welcome and Opening Remarks</b>
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9:15 AM	<b>Review Workshop Agenda &amp; Participant Introductions</b>
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10:00 AM	<b>Global Overview of coral in trade</b>
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- **Presentation. Setting the Stage: Overview of the current state of the stony coral trade and environmental issues (Andy Rhyne, Roger Williams University)**

10:45 AM	<b>Morning Tea/Coffee</b>
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| 11:15 AM | <ul style="list-style-type: none"><li>• <b>County Reports</b><ul style="list-style-type: none"><li>- Indonesia</li><li>- Malaysia</li><li>- Papua New Guinea</li><li>- Philippines</li><li>- Timor Leste</li></ul></li></ul> |
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12:15 PM	<b>Lunch</b>
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| 1:45 PM | <ul style="list-style-type: none"><li>• <b>BioPiracy and Market Trends of Coral Reef Species in the Aquarium Trade and Verification and Certification in the Marine Aquarium Trade - International Standards of Best Practices (Mark Schreffler, PNG, Industry)</b></li></ul> |
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	<ul style="list-style-type: none"> <li>• <b>Coral Mariculture Production Systems (Gayatri Lilley, LINI)</b></li> <li>• <b>From Restoration and Restocking Methods to Ornamental Mariculture: Experiences from the University of the Philippines Marine Science Institute – Edgardo Gomez (University of the Philippines)</b></li> </ul>
<b>3:15 PM</b>	<b>Afternoon Tea/Coffee</b>
<b>3:45 PM</b>	<b>Industry Perspectives</b> <ul style="list-style-type: none"> <li>• <b>Permitting and Exporting Challenges</b></li> <li>• <b>Monitoring Ornamental Trade – (Andy Rhyne, Roger Williams University)</b></li> <li>• <b>Market Demand - Hobbyist perspective of trade(Steven Pro - President, Marine Aquarist Society of North America)</b></li> </ul>
<b>5:15 PM</b>	<b>Wrap Up and Review Day 2</b>
<b>5:30 PM</b>	<b>Adjourn for the day</b>
<b>7:00 PM</b>	<b>Dinner</b>

## Day 2 – July 13, 2011

<b>8:30 AM</b>	<b>Arrival/Sign In</b>
<b>9:00 AM</b>	<b>Welcome. Recap Day 1 and Overview of Day 2</b>
<b>9:10 AM</b>	<b>Overview Working Group Tasks</b> <p style="text-align: center;"><b>COLLECTION Working Group</b></p> <p style="text-align: center;"><b>MARICULTURE Working Group</b></p> <p style="text-align: center;"><b>EXPORT Working Group</b></p>
<b>9:45 AM</b>	<b>Working Group Assignments</b>
<b>10:00 AM</b>	<b>Morning Tea/Coffee</b>
<b>10:30 AM</b>	<b>Begin Working Group Sessions</b>
<b>12:00 PM</b>	<b>Lunch</b>
<b>1:00 PM</b>	<b>Continue Working Group Discussions</b>
<b>2:30 PM</b>	<b>Afternoon Tea/Coffee</b>
<b>3:00 PM</b>	<b>Continue Working Group discussions</b>

<b>4:00 PM</b>	<b>Adjourn for the day</b>
<b>4:30 – 6:30 PM</b>	<b>Coral Fragmentation – Steven Pro</b> Place to be determined at Holiday Inn
<b>7:00 PM</b>	<b>Dinner</b>

### **Day 3 – July 14, 2011**

<b>8:30 AM</b>	<b>Arrival/Sign In</b>
<b>9:00 AM</b>	<b>Welcome. Recap Day 2, overview day 3</b>
<b>9:15 AM</b>	<b>Working Group Sessions</b>
<b>10:00 AM</b>	<b>Morning Tea/Coffee</b>
<b>12:00 PM</b>	<b>Lunch</b>
	<b>Field trip – Transportation from Holiday Inn</b> <b>Visit to coral farm and fragmentation demos</b>
	<b>Dinner – to be determined after field trip</b>
<b>Evening</b>	<b>Working group chairs and interested participants develop outputs</b>

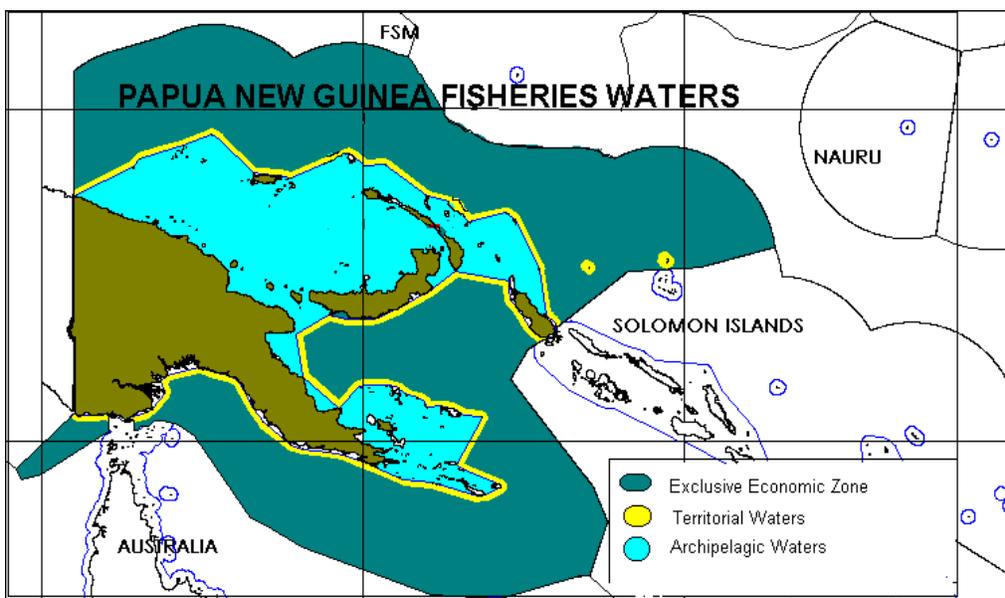
### **Day 4 – July 15, 2011**

<b>8:30 AM</b>	<b>Arrival/Sign in</b>
<b>9:00 AM</b>	<b>Welcome, overview day 4</b>
<b>9:15 AM</b>	<b>Working groups meets</b>
<b>10:00 AM</b>	<b>Morning Tea/Coffee</b>
<b>10:30 AM</b>	<b>Report outs from Working groups – Group leaders or someone from group</b>
<b>11:45 PM</b>	<b>Next Steps, Wrap-up and Closing</b>
<b>12:00 PM</b>	<b>Lunch</b>

## 1. Introduction

Papua New Guinea is an Island State located in the Western Pacific between 141° and 156° east, and between 2° and 12° south. The total land area of 462,243 sq km, comprises four large islands and more than 600 smaller ones, and has a coastline of 17,500 kilometers in length. Deltaic floodplains and inshore lagoons complexes account for 4,250km. Islands and atolls contribute a further 5,440 km, while some 4,180 km of the coastline occurs around system of marshes.

### *Map: PNG Fisheries waters*



The 200-mile Exclusive Economic Zone is 2.4 million square kilometers and is one of the largest in the Western Pacific. Papua New Guinea also recognizes a 12-mile “territorial water” under the National Seas Act (Chapter 361) measured from a low water tide limit.

## 2. Fisheries Legislation

The National Executive Council decided in 1993 to establish the National Fisheries Authority to replace the then Department of Fisheries and Marine Resources through an Act of Parliament. The Fisheries Act (1994) and Regulations (1995) formed the basis for the establishment of National Fisheries Authority and the sustainable exploitation, management and conservation of fishery resources within PNG’s EEZ.

As a result of the need to undertake further policy reforms to provide an environment conducive, the Fisheries Act (1994) has been reviewed and replaced recently by the Fisheries Management Act (1998). The Act governs the functions of the National Fisheries Authority and most fisheries in the country except those in the Torres Strait, a fishery area jointly managed by Australia and

PNG, which are administered separately under the Fisheries (Torres Strait Protected Zone) Act 1983.

The Fisheries Management Act (1998) also takes into consideration of other national legislation or regulations as well as international arrangements relevant to the fisheries sector. Of primary importance is the relationship between the Organic Law on Provincial and Local Level Governments and the Fisheries Management Act (1998).

### 3. Policy Objective

The primary challenge for the Government of Papua New Guinea is to maintain the stability of the economy while simultaneously creating a policy environment conducive for the private sector to invest. To ensure optimum economic benefits and sustainable management of fishery resources in PNG's EEZ, the National Executive Council has decided that the Mission of the National Fisheries Authority is:

**“To ensure that fisheries and marine resources are exploited within the limits of sustainable yields and in a manner that maximizes the long-term economic benefits to Papua New Guinea and its people”.**

Based on the Mission Statement, national objectives were developed for the fisheries sub-sector, are as follow:

- To develop the renewable fisheries and living aquatic resources within the limits of long-term sustainable yields;
- To provide an environment conducive to promote the commercial development of the domestic fishing industry;
- To assist the development of economically viable small-scale fisheries activities which will give fishing communities access to the cash economy;
- To meet nutritional requirements by increasing fisheries production for domestic distribution and consumption;
- To obtain a reasonable resource rent for underutilized tuna resources through access agreements for foreign fishing vessels.
- To ensure environmental and resource management and protection; and
- To upgrade national planning, research and, extension, and monitoring capacity in support of fisheries sub-sector

#### Functions of National Fisheries Authority

The functions of NFA are defined in the Fisheries Management Act (1998), are as follow:

- To manage the fisheries within the fisheries waters in accordance with the Fisheries Management Act (1998), and related Acts, and taking into account the international obligations of Papua New Guinea in relation to tuna and other highly migratory fish stocks;
- To make recommendations to the Board on the granting of licenses and implementing licensing scheme in accordance with the Act;
- Liaise with other agencies and persons, including regional and international organizations and consultants, whether local or foreign, on matters concerning fisheries;
- Operate research facilities aimed at the assessment of fish stocks and their commercial potential for marketing;
- Subject to the *Pure Foods Act*, the *Commerce (Trade Descriptions) Act*, the *Customs Act*, the *Customs Tariff Act*, and the *Exports (Control and Valuation) Act*, control and regulate the storing, processing and export of fish and fish products; and
- Appraise, develop, implement and manage projects, including trial fishing projects;
- Appraise, develop, implement and manage projects, including trial fishing projects;
- Prepare and implement appropriate public investment programs;
- Collect data relevant to aquatic resources;
- Act on behalf of the government in relation to any domestic or international agreement relating to fishing or related activities or other related matters to which the Independent State of Papua New Guinea is or may become a party;
- Make recommendations on policy regarding fishing and related activities;
- Establish any procedures necessary for the implementation of this Act, including tender procedures; and
- Implement any monitoring, control and surveillance scheme, including co-operations, agreements or arrangements with other State or relevant international, regional or sub-regional organizations, in accordance with this Act.

In addition, fisheries have been defined as a concurrent function under the Organic Law on Provincial and Local Level Governments, which was passed in 1995. This has the effect of requiring any provincial legislation dealing with fishing (as a concurrent subject) to be consistent with any national legislation covering the same subject matter. Equally, this requires the National Government to ensure it does not enact any legislation dealing with fisheries unless it is in the national interest.

## **4. Sub Sector Overview**

### **4.1 General**

The coastline and offshore archipelagos present a great diversity of coastal types and marine environments. The Gulf of Papua is characterized by large delta areas, mud flats and mangrove swamps, while the north coast and high island coasts are typified by fringing coral reefs and narrow lagoons. Some of the smaller island clusters lie adjacent to extensive submerged reef systems or broad shallows.

In addition to the National Government, PNG has a decentralized system of semi-autonomous Governments in each of its 19 Provinces. Five of the Provinces are landlocked, while the remainder is coastal or maritime in nature, although some of the coastal Provinces also have extensive inland systems.

### **4.2 Marine Fisheries**

#### **4.2.1 General**

Papua New Guinea fisheries reflect the diversity of the country's coastal environments. Along the mainland and high island coasts and in the smaller island communities fishing activities include the harvesting of the reef flats, spear fishing, shallow-water hand-lining from dugout canoes, netting and trapping in the freshwater reaches of the larger rivers. In the swampy lowland areas net fisheries for barramundi, catfish, and sharks occur, while in the Gulf of Papua there is also a village-based lobster fishery. Collection of invertebrates, both commercially (beche-de-mer as well as trochus and other shells) and for subsistence purposes are extensive, and may exceed finfish harvesting.

Commercial prawn-trawling operations take place in the Gulf of Papua and some parts of southern PNG. A small-scale tuna long-line fishery has also been established, with a handful of vessels now successfully catching sashimi-grade tuna and exporting them to Japan by air via certain Australian ports. This fishery has shown a dramatic increase over the last years with more locals participating in the industry. Currently there are more than 40 tuna long-line vessels (less than 50) operating out of Papua New Guinea.

#### **4.2.2 Subsistence Fisheries**

Subsistence harvesting is the most important component of PNG's domestic fishery in terms of both volume and value, but is being poorly developed. Some of the subsistence catch is sold, traded, bartered or forms the subject of customary exchange. Estimates of subsistence production vary but 26,000 mt is a commonly cited figure. Anecdotal information suggests that this may be an under estimate. A large number of people, estimated at somewhere between 250,000 and 500,000, participate in the coastal subsistence fishery, although the number is thought to have decreased at an annual rate of 1.5% between 1980 and 1990. It is estimated that 30% of the marine subsistence catch comprises coastal bay, lagoon and reef fish, 10% pelagic fish, and the rest invertebrates and seaweeds. Subsistence fishery production has been valued at

about US\$26 million based on a typical price to consumers of about US\$1.00/kg. This is probably an underestimate of the fishery's true value.

The currently approved European Union (EU) loan of 6 million Euros is pre-planned for coastal fisheries development. The loan in part will be used in facilitating onshore facility development to assist fishers in marketing their products.

### **4.2.3 Commercial Fisheries**

The major species landed in PNG's domestic commercial fisheries are, in order of commercial value, prawns, lobster, trochus and mother of pearl shells, beche-me-mer, sashimi-grade tunas, frozen tuna, sharks, lagoon and reef fish, and coastal pelagic fish. A substantial fishery for barramundi, producing 70-140 mt per year, operated for several years until it collapsed in the early 1990s. The market of barramundi was mainly to Australia and within PNG. The fishery through a funding from Australia Centre for International Agricultural Research (ACIAR) has been trying to recover the barramundi stock in Western Province. A result from the project shows that the stock has recovered and a management plan is now been prepared for board's endorsement.

#### **(i) Prawn Fishery**

The prawn fishery is the most consistent valuable commercial fishery, accounting for exports of 762 mt (tail weight) worth about US\$7 million in 2000. In 2002 the fishery accounted for 600 mt valued at US\$5.4 million. Some 80 percent by volume of total prawn export went to Japan. The fishery takes place mainly in the Gulf of Papua; adjacent to Gulf Province, as well as in smaller fishing grounds elsewhere. Five prawn species are routinely harvested but the banana prawn, *Penaeus merguensis*, which makes up about 60% of landings, dominates the catch. Total PNG prawn production has in the past exceeded 1,300-mt-tail weight. Annual catch differences are mainly a result of limitations in the number of fishing vessels imposed by the government in an attempt to maintain the fishery at sustainable levels.

#### **(ii) Lobster Fishery**

Small quantities of lobster are caught throughout PNG's coastal waters but the only concentrated fishery is Torres Strait. This is essentially an artisanal fishery with catches being purchased, processed and exported by commercial operators. Trawling for lobster was permitted in this area until 1985, since which time all lobster in PNG have been caught by diving. Landings are typically around 100 tons per year, and are dominated by the ornate spiny lobster, *Panulirus ornatus*. In 1998 exports were 110 tons valued at US\$2.7 million compared to 122.7 mt valued at US\$2.3 m in 1995. Almost all export of lobster tails went mainly to Australia and the United States of America.

#### **(iii) Shell Fishery**

The shellfishery for trochus (*Trochus niloticus*), pearl shell (three *Pinctada* species, the most abundant of which is the black-lip pearl shell, *P. margaritifera*) and green snail (*Turbo*

*marmoratus*), PNG's third largest export fishery, it is also essentially village-based. Coastal villagers collect valuable shells for sale to middlemen and eventual export or local processing. Total harvests of this group of products in PNG have typically been between 350-550 mt per year, although exports in 1994 were only 253 mt worth about US\$1.9 million. (This figure does not include button blanks or finished buttons that may have been produced locally). Since the establishment of one button factory in 1995, its present status and output along for 1998 is 25.1 mt worth about US\$850,710.

#### **(iv) Beche-de-mer Fishery**

Beche-de-mer productions averaged only 5.5 mt per year in the period 1960-1984 but began increasing as of 1985 and peaked in 1991 with exports of almost 700 mt dried weight (equivalent to a least 7,000 mt green weight). Harvesting in the last few years have begun to decline and 1994 exports were only 207 mt valued at US\$1.8 million.

The decline is a result of unattractive local buying price. The Government currently has put in place management arrangements for some of the more heavily exploited areas and species. It has been estimated that total yields of 700-800 mt per year could be obtained from a properly managed, geographically distributed beche-de-mer fishery in PNG. In 1998, a total of 680 mt of beche-de-mer, valued US\$8.2 million was exported, mainly to Asia.

In general, export of sedentary marine products (trochus, green snail, mother-of-pearl, and beche-de-mer) is now second in value terms only to tuna, and represents a valuable source of income to coastal villagers. Export of sedentary resources (put together) for 1998 was 945.7 mt valued at US\$9.0 million. Beche-de-mer products represented 91.1 percent.

#### **(v) Coastal Fisheries**

Lagoon, reef and coastal pelagic fish are taken by small-scale commercial fishers using nets, lines and a wide variety of sometimes highly specialized and unique other fishing methods. Domestic commercial production of reef fish and large pelagic (excluding long-line-caught tuna) is estimated to be around 3,300 mt, worth at least US\$3.33 million and possibly more. In addition, about 40% of the marine subsistence fishery, or 10,400 mt, is finfish. Total landings of coastal fish species from commercial and subsistence fisheries combined are therefore about 13,700 mt.

Coastal finfish in rural or remote areas of PNG are considered to be under-exploited, and the government has in the past attempted to promote commercial development of these fisheries through the creation of infrastructure and or by providing various forms of operating subsidy.

In particular, a major program established in the late 1970s and now winding down, attempted to establish up to 20 coastal fishery stations, equipped with ice machines and cold stores and serviced by a fish collection system, throughout the country. Despite sustained efforts and high costs the stations, as well as many other small-scale fishery development projects, failed due to insurmountable economic, social and technical barriers. As a result coastal fisheries in most parts of PNG are still under developed.

Demand for fish, in particular fresh fish is high in most urban centers in PNG. Only limited amount of finfish is exported. This is a result of several constraints that limit the prospects for exports, especially quality, infrastructure, high costs of production and inconsistency of supply.

**(vi) Live Reef Food Fish**

A blanket moratorium on the issuance of licenses was imposed in 1998 and is still in force. The National Fisheries Board approved a trial license on a “one of arrangement” to two different companies basically to assess the viability of fishery. The trial project commenced fishing in March 2001. The trial project landed 7.1 tonnes of live fish of which only 6.1 tonnes was exported to Hong Kong valued at US\$35,000. The fishery is now under a developing stage and a management plan is being prepared for board’s endorsement. In the past, operations have exported less than 50 tonnes of fish annually.

**(vii) Shark Fishery**

Exploitation of sharks has taken place in PNG since 1976, initially through a gill-net fishery, which ran from 1976-1982, and then via a long-line fishery which first targeted deep-water sharks for their oil and then, more recently, whaler sharks for their fins and meat. Shark fins also continue to be taken and sold as dry products by small-scale fishermen on an occasional basis. In 1998, a total of 793 mt of frozen shark, valued US\$0.643 m and 4.3 mt of shark fins, valued US\$0.283 m were exported, mainly to Taiwan. A current moratorium prohibits the catch of sharks for commercial purposes. The fishery remains at artisanal level.

**(viii) Tuna Fishery**

By far the biggest fishery resource in PNG is that of tuna and related species. This resource is estimated to have an MSY potential of 300,000-400,000 mt per year, with a first estimated landed value of at least US\$380 million.

**Foreign Access:** Up to now, however, most tuna fishing in PNG has been carried out by foreign fishing vessels (FFVs). In 2001/2002, 76 FFVs from the Philippines, China (Taiwan), Korea and Vanuatu were licensed to fish in PNG’s DFZ under bilateral access arrangements. In addition, 50 US purse seiners were licensed to fish in PNG under the terms of the US tuna Treaty, a regional access agreement involving several Pacific Island countries. These various FFVs collectively took over 200,000 mt of tuna worth an estimated over US\$400 million. Most of the catch was transshipped onto reefer vessels in the PNG designated ports of Wewak, Manus, Kavieng, Rabaul, Lae and Madang, for shipment to canneries in Thailand, Philippines and American Samoa. The number of vessels under the bilateral access arrangement has reduced for the period 2002/2003 has increased to 78 or more with varying access fees. The access accumulative fees for the different bilateral agreements for 2001/2002 and 2002/2003 are US\$6, 498, 000.00 and US\$6, 983, 366.40 respectively.

The National Fisheries Authority is responsible for access arrangements to the tuna resources in PNG's fisheries waters. The foreign fishing activities to access the tuna fishery in PNG's fisheries waters are governed by an agreement. The revised formula for access fees is as follow: Access Fee = Regional Average catch (mt) x Average World Market Price/Mt (US\$) x 6%. The main objective in charging access fees is to capture as much as possible the difference between the gross revenue generated by the fishery and costs required for producing that revenue, a portion of "rent".

**Domestic Access:** After many years of foreign domination, PNG is attempting to promote a more direct participation in the tuna fishery by local companies and individuals. In line with this policy, the Government ceased issuing foreign long-lining licenses in mid-1995, in an attempt to promote development of a domestic tuna long-line industry. Subsequently, after a number of long-liners began operating under local charter arrangements, this too was regulated against, so that the fishery was closed to all but bona fide domestic entrants.

At present over 40 tuna long line vessels operate in PNG waters by local companies and the catch is exported in fresh chilled form to Japan by air while lower-quality fish may be airfreighted to Australia or sold on the domestic market.

Papua New Guinea has now in place a National Tuna Fishery Management Plan (1998). The broad objective is to give effect to the fishery management objectives and principles contained in the Fisheries Management Act (1998), and specifically to:

- Maximize benefits to PNG from sustainable use of tuna resource;
- Satisfy PNG's regional and International obligations in regard to the management and conservation of tuna resources, while holding the country's interest paramount;
- Minimize any adverse impacts of tuna fishing and related activities on the marine environment;
- Improve decision making in relation to the tuna fishery through effective communication and consultation mechanism;
- Minimize any adverse impacts of the non-industrial sector; including artisanal and traditional sectors; and
- Ensure that the provision of the Plan are developed, implemented, administered and monitored in an efficient and cost-effective manner.

#### **(ix) Aquarium Fishery and Stony Corals**

Although Papua New Guinea (PNG) is one of the world's major coral reef nations with an estimated 40,000 square kilometers of coral reefs, sea grass beds, and mangrove forests, it is relatively new in the arena of stony coral mariculture. As such, no legislations or management practices and standards have been formulated to govern the culture in terms of harvest and export. However, being a CT6 country, Papua New Guinea has signed the Coral Triangle Declaration on Coral Reefs which generally protects reef areas.

In 2010, Papua New Guinea ventured into the industry and successfully established a pilot coral mariculture program at Fishermans Island about 3km from Port Moresby, the capital of

PNG.

The program looks at enhancing community based fisheries in terms of providing food security, income generation, and alleviating poverty. On this token, 20 local women from Fisherman's Island were trained in sustainable mariculture activities. The first of these maricultured corals will reach international markets once all necessary guidelines, regulations and management measures are in place and appropriate permits given, especially CITES. In addition, 30% of all corals produced from the pilot program will stay in PNG and be used for reef restoration programs.

Unlike aquacultured corals that are grown in a closed system such as an aquarium, maricultured corals are grown in open, ocean-based farms. To start, the pilot program cultured 20 different genera and 80 species of stony corals, including various *Acropora*, *Acanthastrea*, *Favia*, *Hydnophora*, *Montipora*, *Mycedium*, *Oxypora*, *Pavona*, and *Seriatopora* species.

The Fisherman Island coral farm is located in 4-5 meters (13-16 ft) of water adjacent to the island in a location selected by MAR staff after extensive survey work. At the farm site, MAR staff deployed 10 custom-built iron platforms and assigned two local coral farmers to each platform. Mother colonies were sustainably collected from nearby healthy reefs and brought to the coral farm, where the farmers fragmented the mother colonies into as many as 10 individual colonies or "frags." These frags were then affixed to numbered cement discs and affixed to the platforms with wire mesh. When the frags reach an appropriate size, they can be exported for sale or used to restore coral cover on degraded reefs.

Maricultured corals are the future of a robust and sustainable reef-keeping hobby. While aquaculture corals grown in import countries do play an important role in the marine aquarium trade, maricultured corals have the advantage of being able to bring new species and color morphs to the trade, as well as generate an income source to coastal communities where the corals are cultured.

"This places a direct financial incentive for the communities nearest the reefs to keep their reefs healthy. In addition, maricultured corals are ideal for use in local reef restoration projects. **We expect to see a net gain in local coral cover as a result of our mariculture and reef restoration efforts in PNG, and that's even after we have supplied aquarists with some of the most exciting corals they have seen in a long time.**"

PNG being a signatory to CITES will have to demonstrate that these corals are harvested using non-detrimental finding techniques and or are taken from F2 generations for export. Department of Environment and Conservation will also be involved in conducting audit and certification prior to export.

NFA is currently in the process of finalizing the management plan for national aquarium fishery including developing standards for coral and aquarium ornamentals to comply with international obligations and requirements when exporting corals. The option of certification is in the planning stages and maybe considered once export stabilizes.

## **(x) Fishery Resources Management**

Fishery resources management and sustainable development are the major criterion of all fishery policies, which require combination of biological, economic, environmental and socio-cultural considerations. PNG has to date put into place a number of fishery management plans, which include the following.

- The National Tuna Fishery Management Plan (1998);
- The Prawn Fishery Management Plan;
- The Lobster Fishery Management Plan;
- The Beche-de-mer Fishery Management Plan by Province.
- Live Reef Food Fish Management Plan (in Draft Form)
- Barramundi Management Plan (in Draft form)
- National Aquarium Fishery Management Plan (Draft)

These management plans provide a mixture of approaches both restrictive and precautionary to ensure their long-term sustainability. As a result, each management plan is subject to periodic review and change. In implementing each plan, licensing and monitoring inputs will be the major input controls. It should be noted that apart from the tuna fisheries, harvesting of all other fisheries are restricted activities to only PNG nationals and citizens.

## **(xi) Fishing Licences**

All fisheries and related activities are subject to a licence under the Fisheries Management Act 1998. The National Fisheries Board is responsible for granting of fishing and shore-base fish processing and storage licences. All licences shall be subject to terms and conditions as specified in the Act, and any applicable access agreements (in the case of distant water fishing nations).

Government policies are directed towards an incentive for a long-term development of a vibrant domestic industry. As result, the government has increased licensing periods of certain domestic fishing activities from 1 year to 5 years, whereas fleets from the DWFNs are subject to 1-year licence under the agreement.

## **5. Administration**

The Fisheries Management Act (1998) provides for the establishment of the National Fisheries Authority (NFA) as a fully commercial statutory authority. The NFA, which has a more commercial orientation than its predecessor, began operating in 1995 as a non-commercial statutory authority.

The NFA plays a coordinating and facilitating role in PNG's fishing industry but is attempting to avoid the interventionist approaches of the past. The Authority is keen to avoid undertaking 'welfare' type development projects, most of which have in any case now been devolved to provincial authorities as a result of the Organic Law. An extensive organisational capacity

building project has supported the transformation of NFA's organisational culture and has been instrumental in defining the Authority's new mandate, which is still evolving.

The NFA's activities are under the overall control of the National Fisheries Board, also established by the Fisheries Management Act of 1998. The NFA acts as Secretariat for the Board, which meets periodically in order to review NFA's proposed activities prior to their being implemented, as well as to consider other issues related to fisheries.

The other main body involved in PNG fisheries is the Fishing Industry Association (FIA), which was formed in January 1991, to provide a formal channel through which fishing related businesses could voice their ideas, opinions and concerns relating to the development of the sector. The Association now groups together some 53 fishing companies. It has been quite outspoken since its formation and has become both respected and influential in the development of fisheries policy in PNG. The Association has successfully lobbied Government for the removal of a range of taxes and levies and the granting of other concessions to the industry. Two representatives of the FIA sit on the National Fisheries Board, as well as on the governing Council of the National Fisheries College. It seems likely that, now the FIA is well established it will continue to provide a voice for the interests of the fishing industry.

## **6. Structural Adjustment Programme**

The Structural Adjustment Programme in 1995 indicated that PNG fisheries have great potential to contribute to economic as well as social benefits. The Government has realised this and has put a lot of effort to change certain fiscal policies. The Fisheries Act (1994) has also been reviewed and replaced by the Fisheries Management Act (1998). These changes are in line with the Government's aim of providing an environment conducive for the private sector to invest and operate.

## **7. Environmental Considerations in Fisheries**

The Government of Papua New Guinea is committed to ensuring sound environmental framework for resources use. The Office of Environment and Conservation is responsible for the sustainable use of PNG's natural resources and compliance with environmental quality standards set by the Government. With regards to fisheries, the policy is that "development activities" which aid a sustainable management of fisheries and improve the welfare of communities depending on these fisheries will be pursued. In view of the significance of PNG's marine resources to the economic well-being of the country, impact assessment plans on major fisheries projects (canneries and other processing and support facilities) that will affect the marine environment must be submitted.

## **8. International Issues**

The Government of Papua New Guinea maintains direct contact on technical issues with regional and international organisations dealing with fisheries. Policy and other important matters are managed in the first instance through designated official contact points, most often the Department of Foreign Affairs and Trade. Papua New Guinea is a member of Forum Fisheries

Agency (FFA), the South Pacific Community (SPC) and the South Pacific Environmental Programme. PNG is also Party to a number of Treaties and Agreements relating to the management of regional fisheries, including:

- The Treaty on Fisheries between the Government of the United States of America and Certain Pacific Island Nationals;
- The Convention for Prohibition of fishing using Driftnets in the South Pacific region;
- The Niue Treaty on Cooperation in Fisheries Surveillance and Law Enforcement in the South Pacific region;
- The Nauru Agreement Concerning Cooperation in the Management of Fisheries of Common concern
- The Palau Arrangement for Management of the Western Pacific Purse Seine Fishery; and
- The FSM Arrangement for Regional Fisheries Access.

Papua New Guinea is a signatory to the United Nations Convention on the Law of the Sea (UNCLOS) and the Agreement for the implementation of the Provisions of the United Nations Convention of the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks. PNG is also a Party to the Washington Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

## **9. Summary and Conclusions**

In summary, there are two categories of policies, the national policies of government, and the various policies of the individual sectors/sub-sectors. Both categories of policy are relevant to fisheries sub-sector. Important government policies, which directly and indirectly affect fisheries, include:

- Policies involving tariffs, duties, taxes and depreciation;
- Policies related to wage rates, prices of goods and services, inflation, currency valuation;
- Monetary; and
- Fiscal policy.

Fisheries sector policies are guided by the Fisheries Management Act (1998). The Government has adopted the following strategies within the fisheries sector:

- To develop the renewable fisheries and aquatic resources within the limits of long term sustainable yields;
- To assist the development of a commercial viable domestic fishing industry;
- To assist the development of a commercial viable small-scale fisheries activities which will provide access to cash economy and meet nutritional requirements of both rural and urban communities; and
- To upgrade and strengthen national planning, research, extension and monitoring capacity.

The fishing industry of Papua New Guinea is at its infant stage despite immense opportunities for further development of the fisheries resources to become competitive in the world fish trade markets. However, the current government policies are now more supportive of investment in the sub-sector. The fishery resources, in particular tuna fishery is capable of producing major benefits through export of raw, processed and canned products.

The fishing industry maintains that prudent macro-policies are important to improve PNG economy and to lead to improving investment growth in the private sector. The ultimate aim is to ensure PNG maximises benefits from its resources and therefore the Government strategy for the fisheries sector is oriented to achieve this.



International Workshop on the Trade in Coral Reef Species:  
Development of International Guidelines for Environmentally Friendly  
Stony Coral Mariculture

BALI, 12-15 July 2011

Yayasan Alam Indonesia Lestari (LINI)  
Asosiasi Koral, Kerang dan Ikan Hias Indonesia (AKKII)



# The status of the coral trade and coral mariculture in Indonesia

## Outline:

1. Background
2. The Indonesian trade in maricultured coral
3. The Management of maricultured coral
4. Collection
5. Mariculture
6. Economic Aspects
7. Challenges for coral mariculture in Indonesia

# Background

- Coral mariculture started in Indonesia in 1998, with research on the types of *Acropora*.
- In 2002, the Government stipulated that all exporters of wild coral had to start coral mariculture
- The first export of maricultured coral from Indonesia was in 2002, with the majority of exported species being fast growing and small- polyped species.
- Coral mariculture provides economic income for many coastal communities. It is estimated that the number of families benefiting from coral mariculture in Indonesia is in the thousands.
- The keeping of corals in aquariums- and therefore the international market - continues to grow. The US remains the biggest market for live corals for aquarium trade.

# The Indonesian trade in maricultured coral

Indonesia exported :

- In 2008: 1.101.575 pieces of live coral, of which 39 % (432.661 pieces) was from coral mariculture
- In 2009: 973.003 pieces of live coral, of which 29 % (282.066 pieces) was maricultured coral

<b>(numbers are pieces of coral)</b>	<b>2008</b>	<b>2009</b>
total export of live hard coral	1.101.575	973.003
<i>coral mariculture</i>	432.661	282.006
<i>wild coral</i>	668.914	690.937

# The export of maricultured corals in 2008 and 2009

Species	2008	2009
<i>Acropora</i> sp.	232.244	181.900
<i>Hydnophora rigida</i>	12.551	7.465
<i>Merulina ampliata</i>	6.964	2.280
<i>Montipora</i> sp.	43.473	33.024
<i>Pocillopora</i> (3 sp)	28.548	8.281
<i>Porites</i> (3 sp)	20.974	2.036
<i>Seriatopora</i> (2 sp)	14.947	1.641
<i>Stylopora pistillata</i>	11.355	6.440
<i>Caulastrea.</i>	12.866	5.738
<i>Echinophyllia aspera</i>	3.430	1.390
<i>Echinopora lamellosa</i>	6.571	3.437
<i>Euphyllia</i> (2 sp)	23.616	25.764
<i>Galaxea</i> (2 sp)	6.392	1.164
<i>Turbinaria</i> (4 sp)	8.730	1.506
<b>Total Exports</b>	<b>432.661</b>	<b>282.066</b>

## Quota of the hard corals 2008 - 2011

species	2008	2009	2010	2011
<i>Acropora sp.</i>	18.000	15.035	13.300	9.850
<i>Merulina ampliata</i>	5.400	5.092	5.093	5.093
<i>Montipora sp.</i>	8.100	7.759	7.760	7.760
<i>Porites spp</i>	49.950	47.700	45.000	42.750
<i>Euphyllia glabrescens</i>	21.600	24.000	18.000	18.000
<i>Euphyllia ancora</i>	28.800	32.000	28.000	27.000
<i>Galaxea fascicularis</i>	16.200	17.460	17.460	14.550

Lower quotas for some species that have been successfully produced through coral mariculture

# The Management of Maricultured Coral

The live corals traded from Indonesia are from wild collection and also from maricultured corals through fragmentation.

The Indonesian CITES Authority produced guidelines for wild coral collection, coral mariculture and currently to finalise the guideline for coral mariculture audit.

Control measurements on wild collection are through the mechanisms of:

- Establishment of collection quotas by the Indonesian CITES authority
- Issuance of permits (collection, inter-island transportation and export)
- Licenses for traders (local and exporter)

Control measurements on coral mariculture are through :

- Issuance of permits (mariculture site, inter-island transportation and export)
- Licenses for growers
- Documentation (origin of broodstock, fragmentation activities reports, harvest reports)
- Tagging/labelling
- Assessment by appointed auditors (from the Indonesian Coral Reef

Working Groups and the Research Centre for Oceanography)



# TAGGING

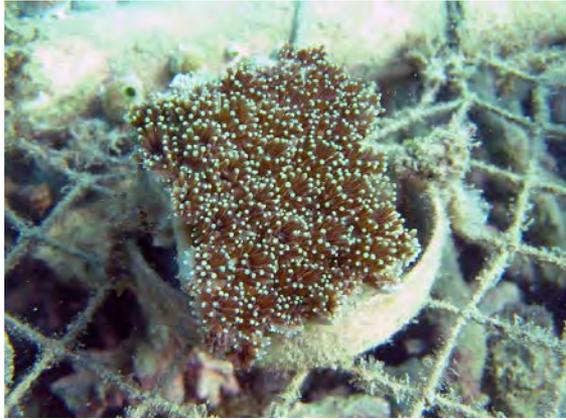


**Label: ID0805Acsp2.00486**  
**08 - Company Code (XXXX Ltd.)**  
**05 - Year of Propagation (2005)**  
**Acsp - Species Code (*Acropora sp.*)**  
**2 - Generational Level (second fragmentation)**  
**00486 - Fragment Number (#486)**

# Collection

- Broodstock are only allowed from areas approved for coral collection.
- The collection of broodstock must come from wild coral based on quotas issued by the CITES authority. There are 11 provinces where collection of live wild corals is allowed. Currently there are 24 species that are allowed to be used for coral mariculture for the live coral trade.
- If the species are not listed in the quotas, broodstocks may be collected from the surrounding mariculture sites after receiving a recommendation from the CITES authority.
- The maximum size of broodstock taken from the wild is 10 cm in diameter or height.
- Growers are encouraged to try species that are not yet on the list. Based on the reports on growth rates, mortality rates, the availability of broodstocks, and mariculture area, the CITES authority can provide recommendations as to whether the species are eligible for trade or not.

## Various species of corals used for coral mariculture



Sub massive

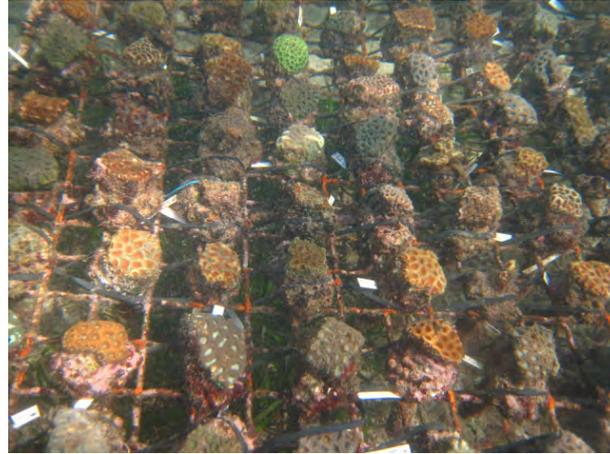


Encrusting/plating

# Various species of corals used for coral mariculture



Plating/foliose



Massive



Encrusting and Plating



Massive



Encrusting

## TOOLS



A collection of tools used for the collection of mother stock from the wild



A plier use to snip the lower branches off

# Mariculture

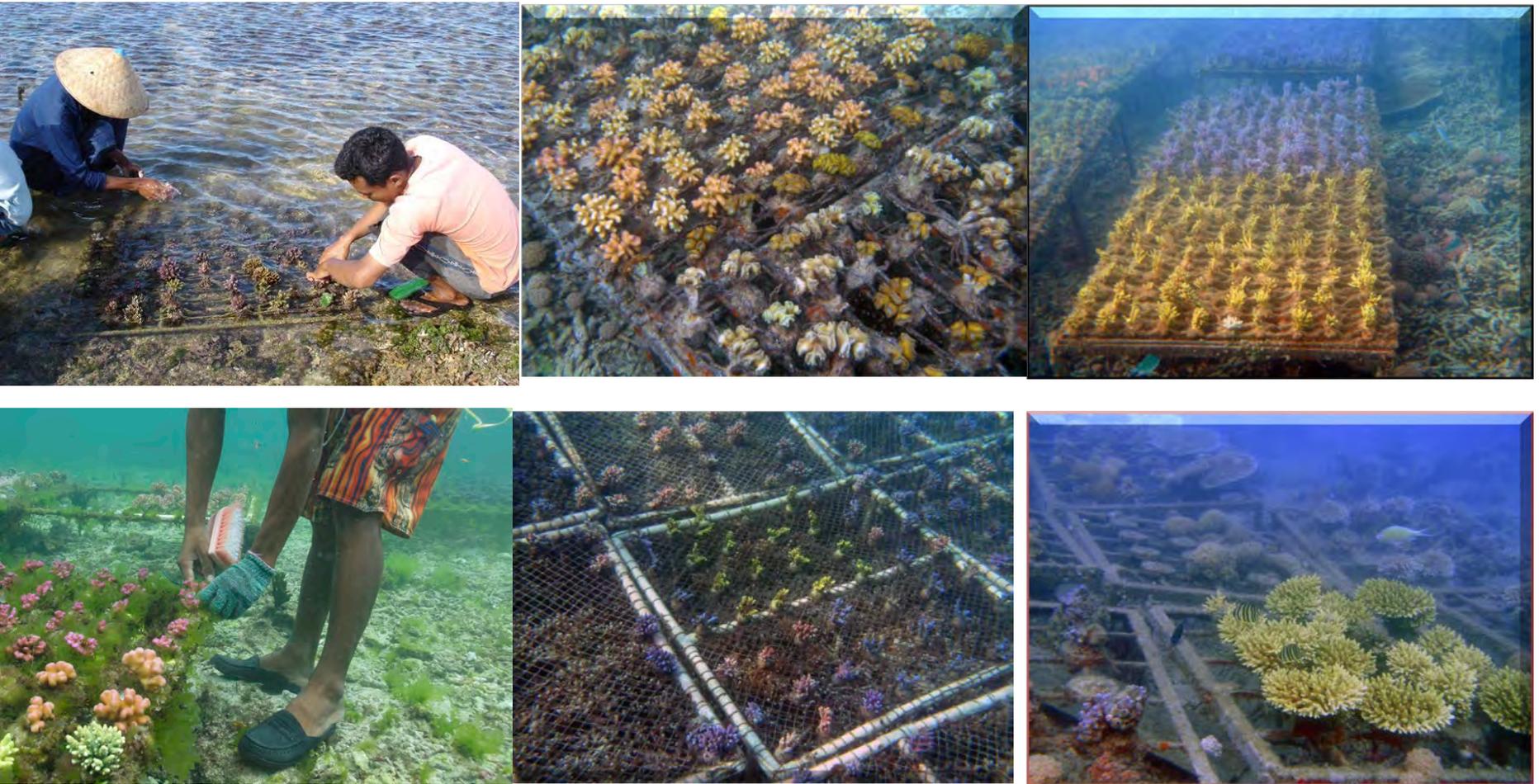


In situ: Mariculture



Ex situ: Indoor facility

# Coral mariculture in shallow water



The current practice for *in-situ* coral mariculture relies on the use of tables/racks as growth platforms

The tables for the majority of fast-growing species are placed in shallow water at depths of between 2-5 meters

# Coral mariculture in deeper water

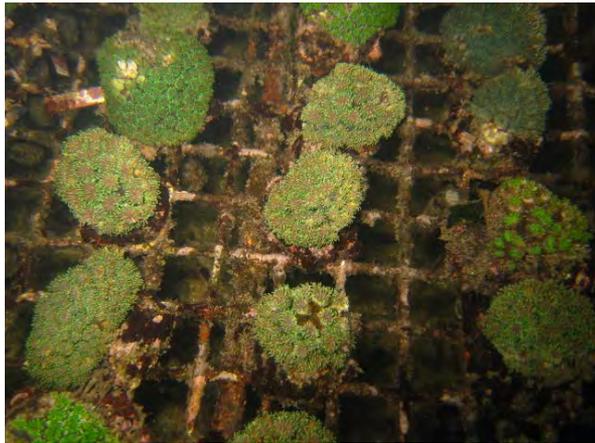


Some growers put the tables in deeper water (up to 20 meters), to suit the natural habitat where the species was originally found and thrived.

# Broodstocks



A mother stock laid on seafloor in between living corals.



A diverse and well organized collection of mother stock corals on racks

# Various Bases/Plugs



This trough is filled with sand and used as a mold to form coral bases



A selection of coral plug/base designs.

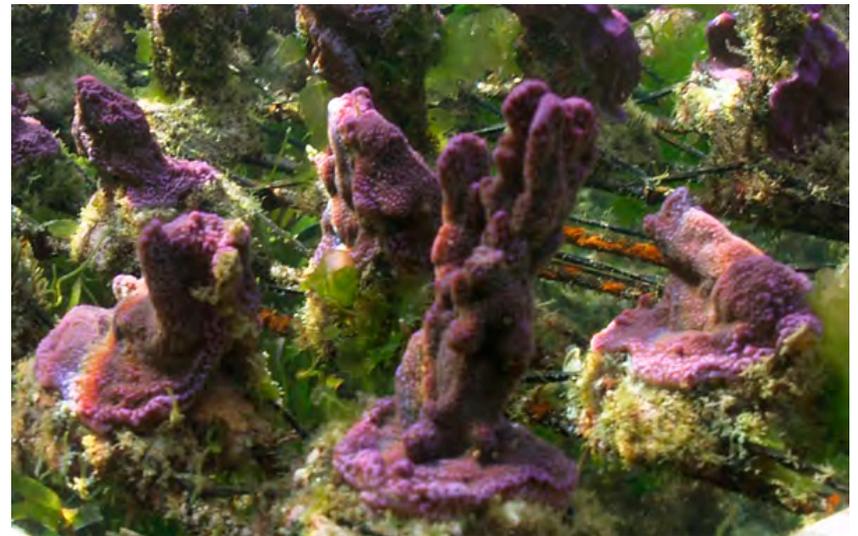


The two bottom photos depicts a novel attachment method where a bottle cap is inserted into the cement base, allowing it to be screwed onto the corresponding threaded bottle top attached to the table.

## Some methods of attachment



These coral fragments have just been attached to the coral plugs with 2-part autobody filler. They are ready to be placed on the tables, as the autobody filler will harden underwater.



These corals have firmly encrusted over the epoxy and coral plug demonstrating many months of growth.

# Method of Corals Propagation



Corals colony in nature



Propagation



New mother corals



Mother corals after 4 months



Group of mother corals that ready to be propagated



Propagation



New offspring corals



Offspring corals after 4 months and ready to trade

# Economic Aspects

- Coral mariculture activities need investment and time to produce the harvest.
- The prices of some maricultured corals, particularly for fast-growing species, are lower than for wild corals of the same species.
- As there are still quotas for wild corals, this creates no incentives to promote coral mariculture.

Species	Maricultured coral	Wild coral
<i>Acropora spp.</i>	\$. 5-8	\$. 12-25
<i>Montipora spp.</i>	\$. 5-8	\$. 12-25
<i>Hydnophora spp</i>	\$. 5-8	\$. 12-20
<i>Pocillopora spp</i>	\$. 5-8	\$. 12-18
<i>Porites spp</i>	\$. 5-8	\$. 5-10
<i>Seriatopora spp</i>	\$. 5-8	\$. 12-18
<i>Stylophora pistillata</i>	\$. 5-8	\$. 12-18
<i>Caulastrea sp.</i>	\$. 2-10	\$. 5-10
<i>Echinophyllia spp</i>	\$. 2-10	\$. 15-30
<i>Euphyllia spp</i>	\$. 2-10	\$. 5-15
<i>Galaxea spp</i>	\$. 2-10	\$. 3-14
<i>Merulina spp</i>	\$. 2-10	\$. 10-16
<i>Turbinaria spp</i>	\$. 2-10	\$. 2-10

# Challenges for coral mariculture in Indonesia

- Lack of controls during mariculture activities, such as unreported and inaccurate data on the numbers of each species, the availability and the number of broodstocks, species misclassified/misidentified;
- Habitat degradation due to uncontrolled broodstock collection and mariculture activities such as placing the racks on top of live coral colonies.
- Threat of local depletion/extinction of target species due to uncontrolled mariculture activities
- Lack of traceability, limited paper trails, limited data kept or reported.
- Lack of transparency, need more reliable data on the value or volume of corals in trade
- The Indonesian CITES authorities distinguish between trade in wild coral and coral mariculture. However, wild corals are often claimed to be maricultured;

# Thank You



The Indonesian Nature Foundation – Yayasan Alam Indonesia Lestari

# Country Report on Coral Farming, Malaysia



Daud Awang

Department of Fisheries Malaysia

Fisheries Research Institute Sarawak

[daudawang@gmail.com](mailto:daudawang@gmail.com)

<http://www.fri.gov.my/marsal>



# OUTLINE

- Legislation
- Distribution of Coral Reefs
- Coral Farming : Innofisheries
- Export
- Way Forward



# Facts

## Cited as International Trade in Endangered Species Act 2008



### LAWS OF MALAYSIA

Act 686

INTERNATIONAL TRADE IN ENDANGERED SPECIES  
ACT 2008

Act 686

Gazetted 14 Feb 2008

Involved with 7 Federal  
Agencies, Sabah & Sarawak  
as Management Authority

NRE as Lead Management  
Authority dan Lead Scientific  
Authority





Natural Resources & Environment as LMA & LSA

Management Authority (MA)

Scientific Authority (SA)

Sabah FISHERIES Dept

Department of Fisheries Malaysia

Sarawak FORESTRY Dept/ Sarawak FORESTRY Corporation



LMA = LEAD MANAGEMENT AUTHORITY

LSA = LEAD SCIENTIFIC AUTHORITY

MA = MANAGEMENT AUTHORITY

SA = SCIENTIFIC AUTHORITY

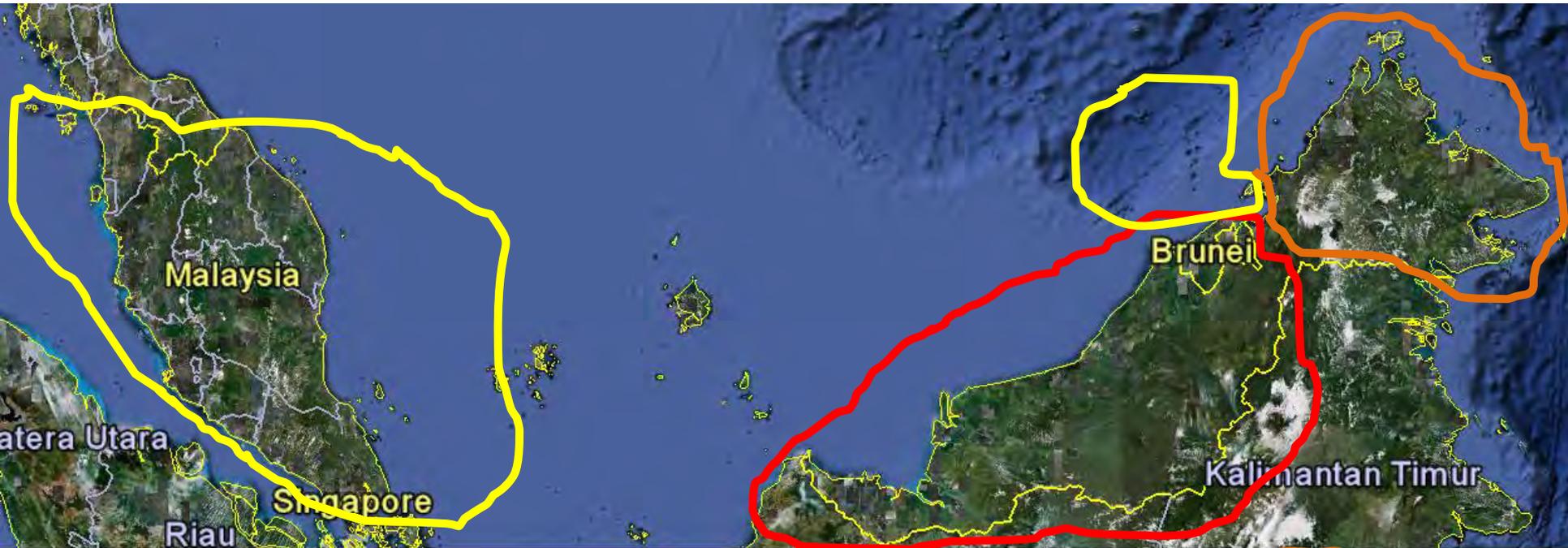
## FUNCTION SA : ACT 686

Advice to Lead Mgmt Authority & Mgmt Auth. :

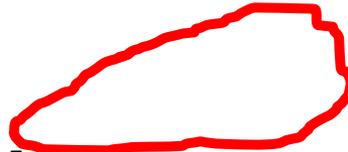
- Impact of the trade on the survival of the corals
- Quotas for the export
- Appropriate care of any live corals species to be imported or to be kept in Malaysia
- Appropriate treatment of any confiscated coral species



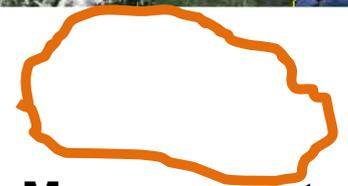
# Structure of CITES Authorities in M'sia



**Management Authority within Peninsular M'sia : Department of Fisheries Malaysia, MoA**



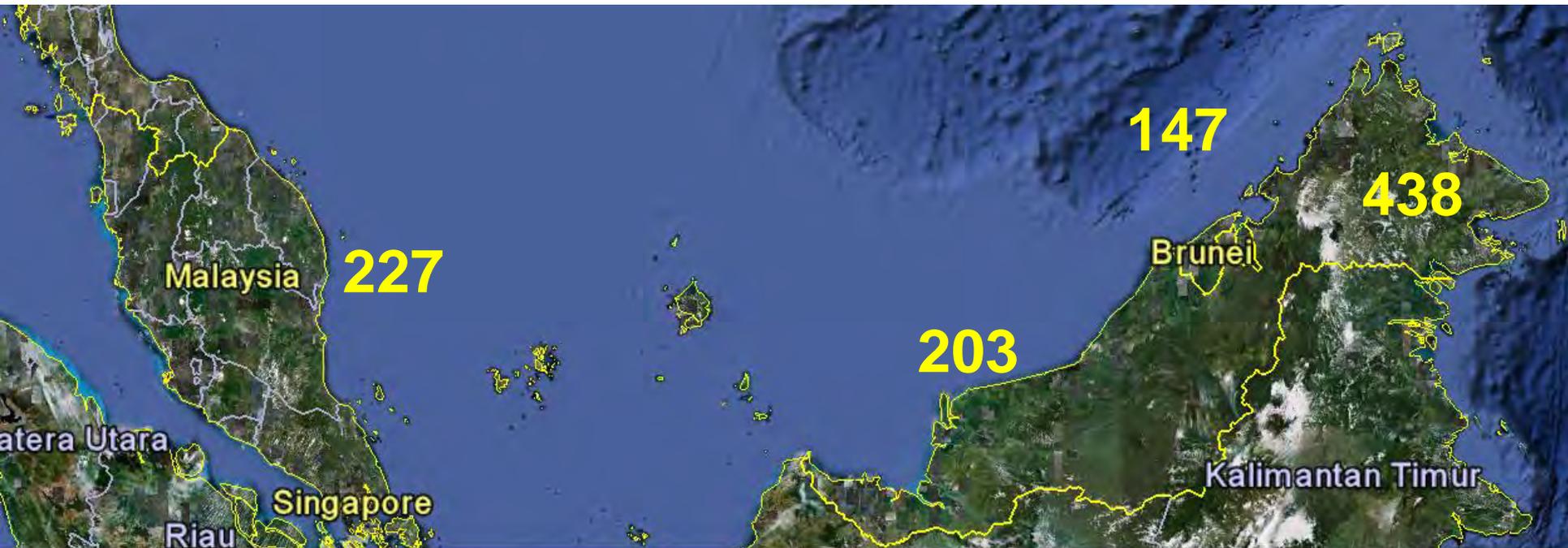
**Management Authority within Sarawak : Sarawak Forestry Department**



**Management Authority within Sabah : Sabah Fisheries Department**



# Coral Distribution



**East Peninsular M'sia = 227 sp**

**Sabah = 438 sp**

**Layang Layang Island = 147 sp**

**Sarawak = 203 sp**

# INNO FISHERIES SDN. BHD.

Semporna | Sabah | Malaysia

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[www.innofishCfp.com](http://www.innofishCfp.com)

Tel: 088-326523

Fax: 088-326522

Email: [sales@innofishCfp.com](mailto:sales@innofishCfp.com)

## Online Store for Live Cultured Coral SABAH - MALAYSIA

WELCOME TO OUR SABAH CORAL FARM !

### OUR CORAL FARM MISSION STATEMENT

OUR CORAL FARM Staff & Management are dedicated to Coral Reef Conservation in Malaysia through the sustainable and limited utilisation of wild hard and soft corals for the cultivation of live F1 and F2 coral seedlings with the premise of eventually having our own "Mother Corals" to sustain our farming operations for years to come.

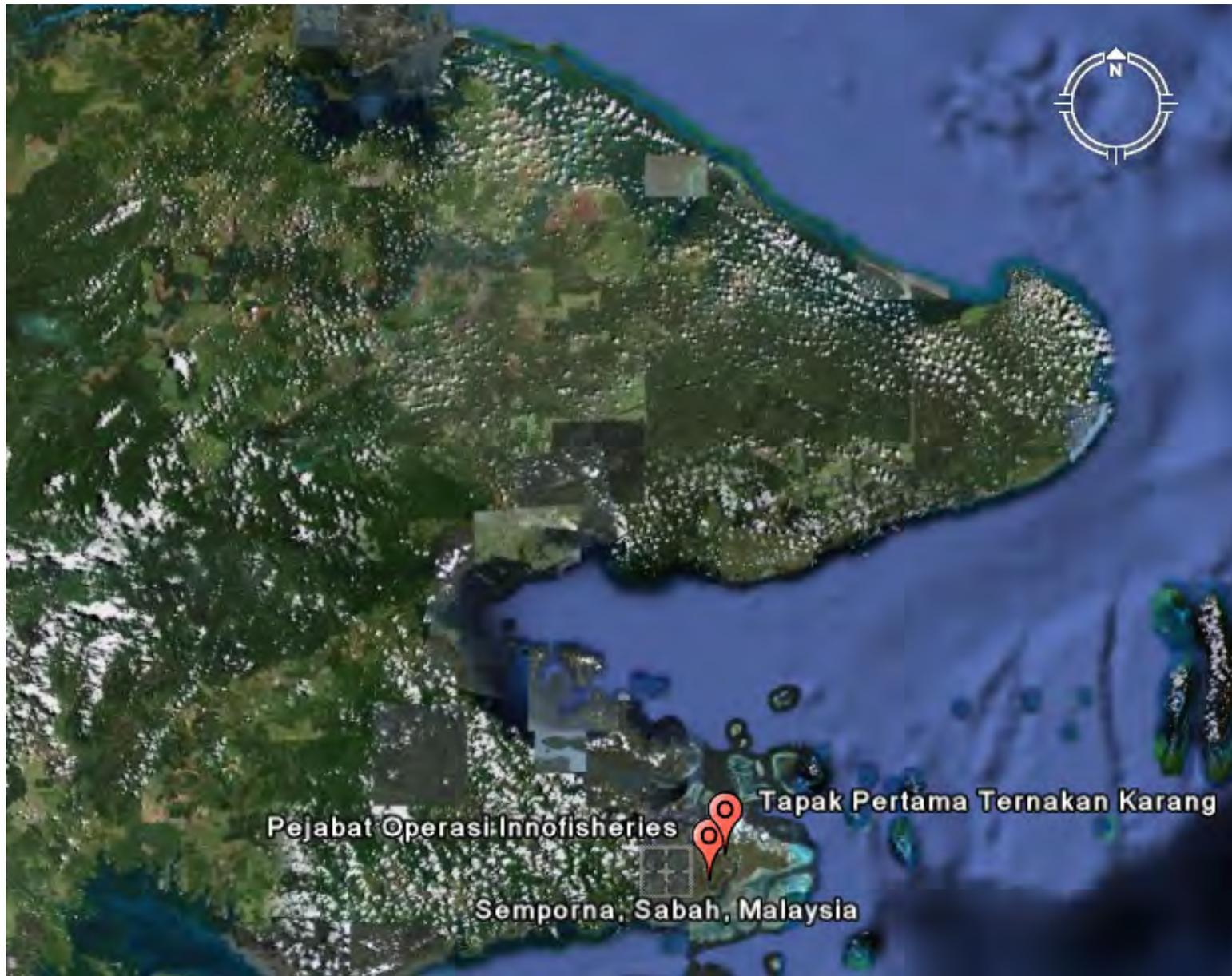


INNO FISHERIES SDN. BHD.

A GROUP COMPANY OF  
INNOPISE CORPORATION  
SDN. BHD.

SABAH - MALAYSIA





Pejabat Operasi Innofisheries



Tapak Pertama Ternakan Karang

Semporna, Sabah, Malaysia

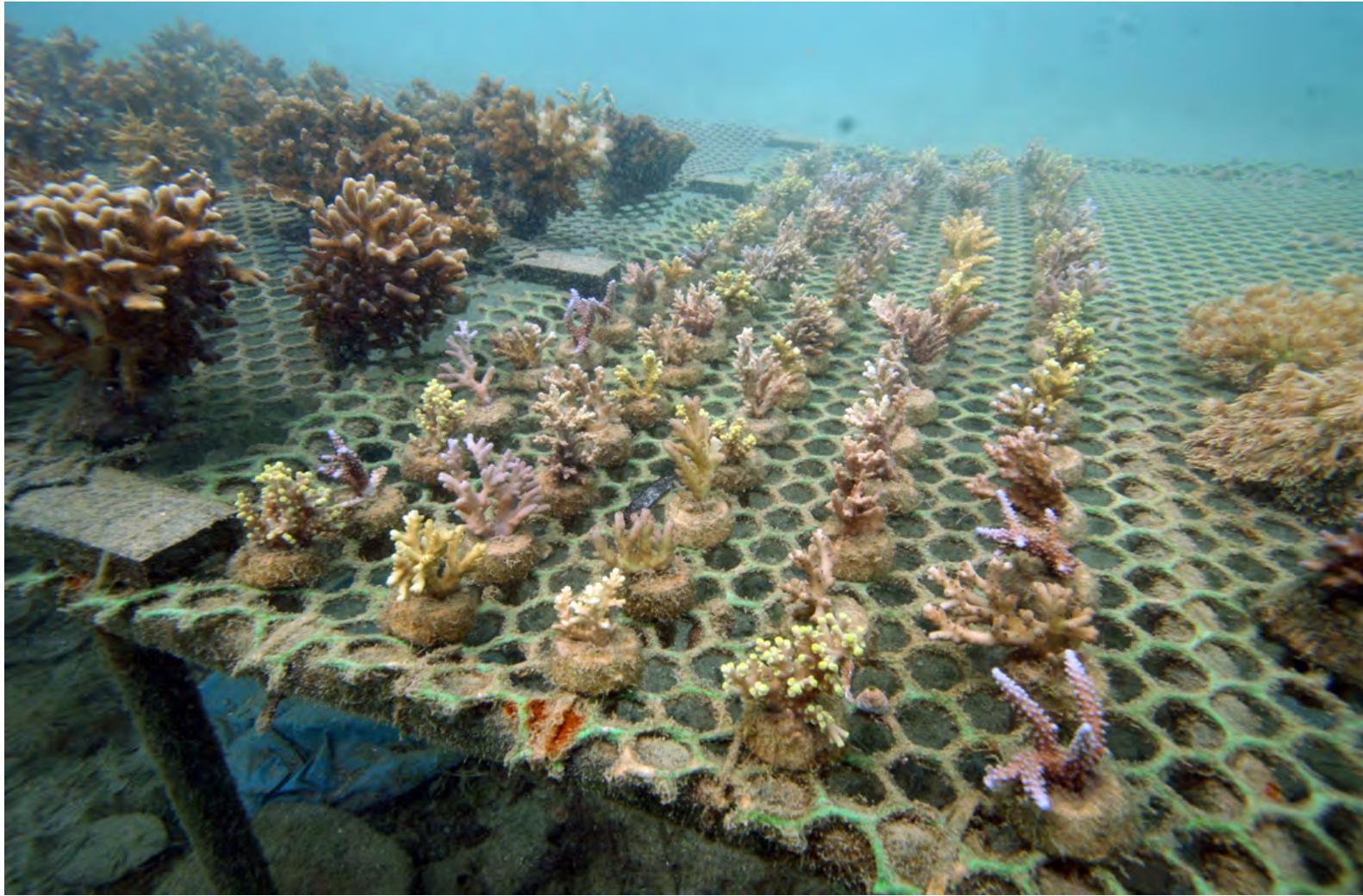
# First Visit to Innofisheries Coral Farm

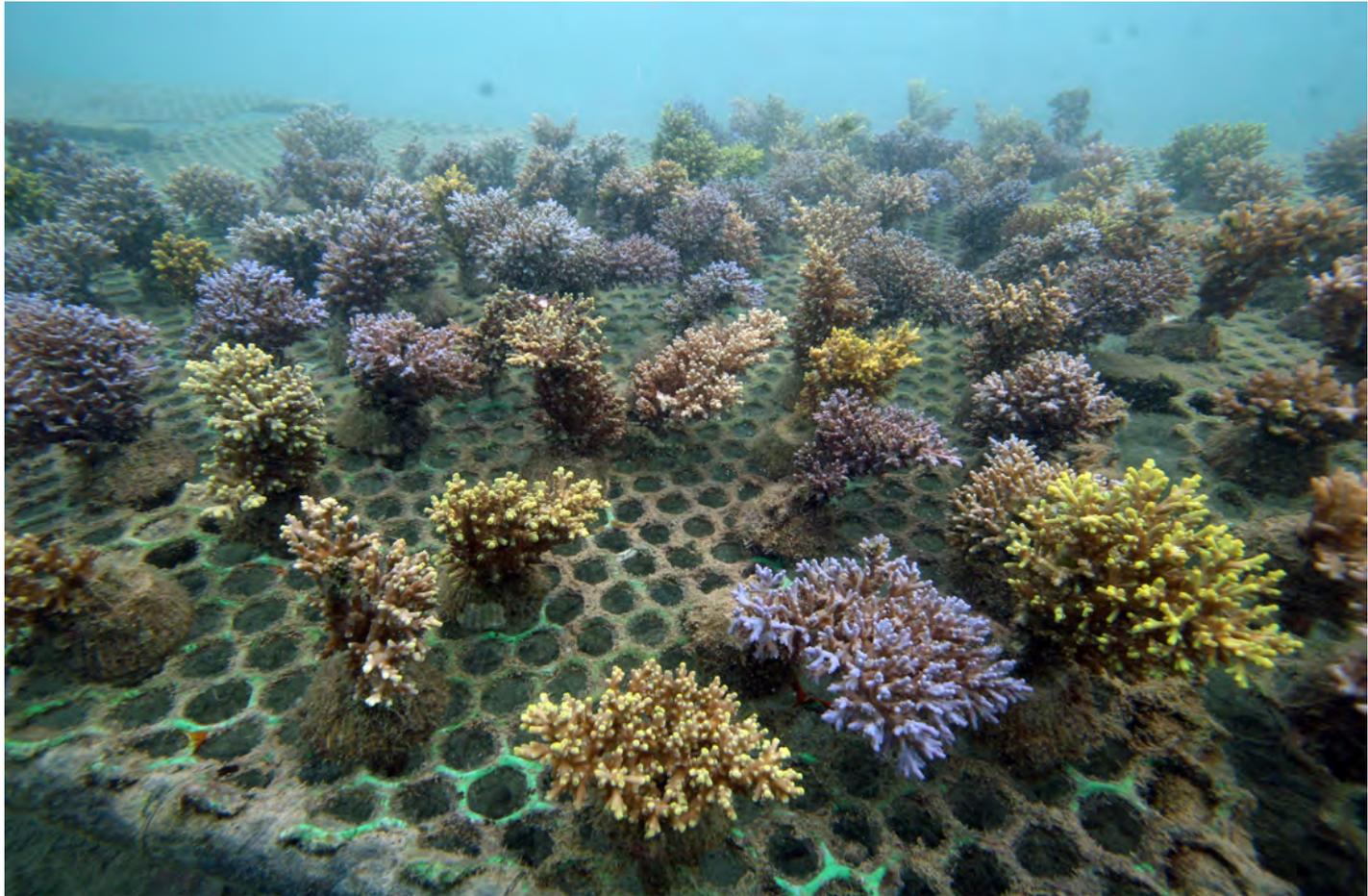
29 Sept. 2009

1) Tampi Tampi (Semporna)















## 2) Kerindingan (Semporna)



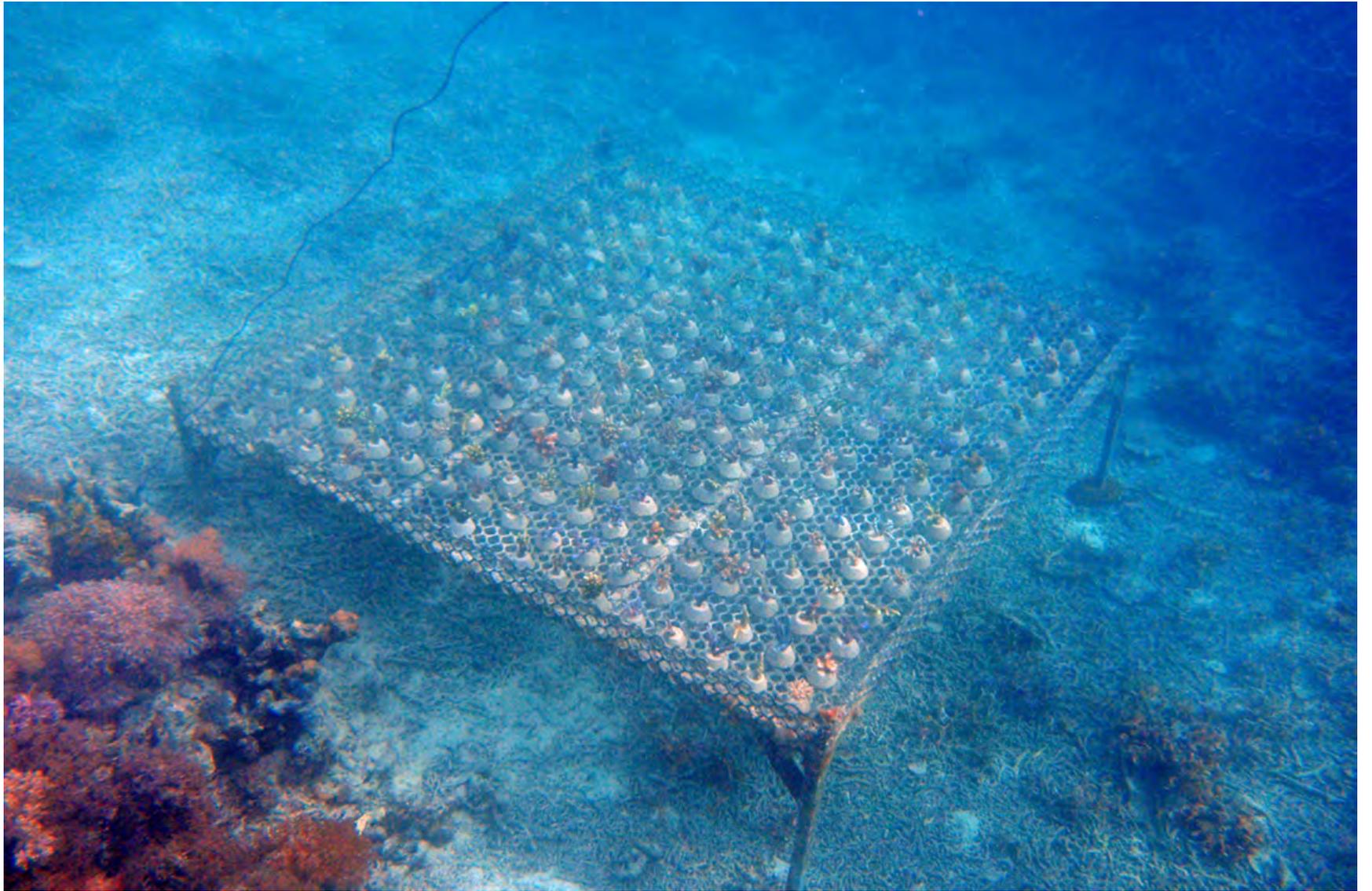


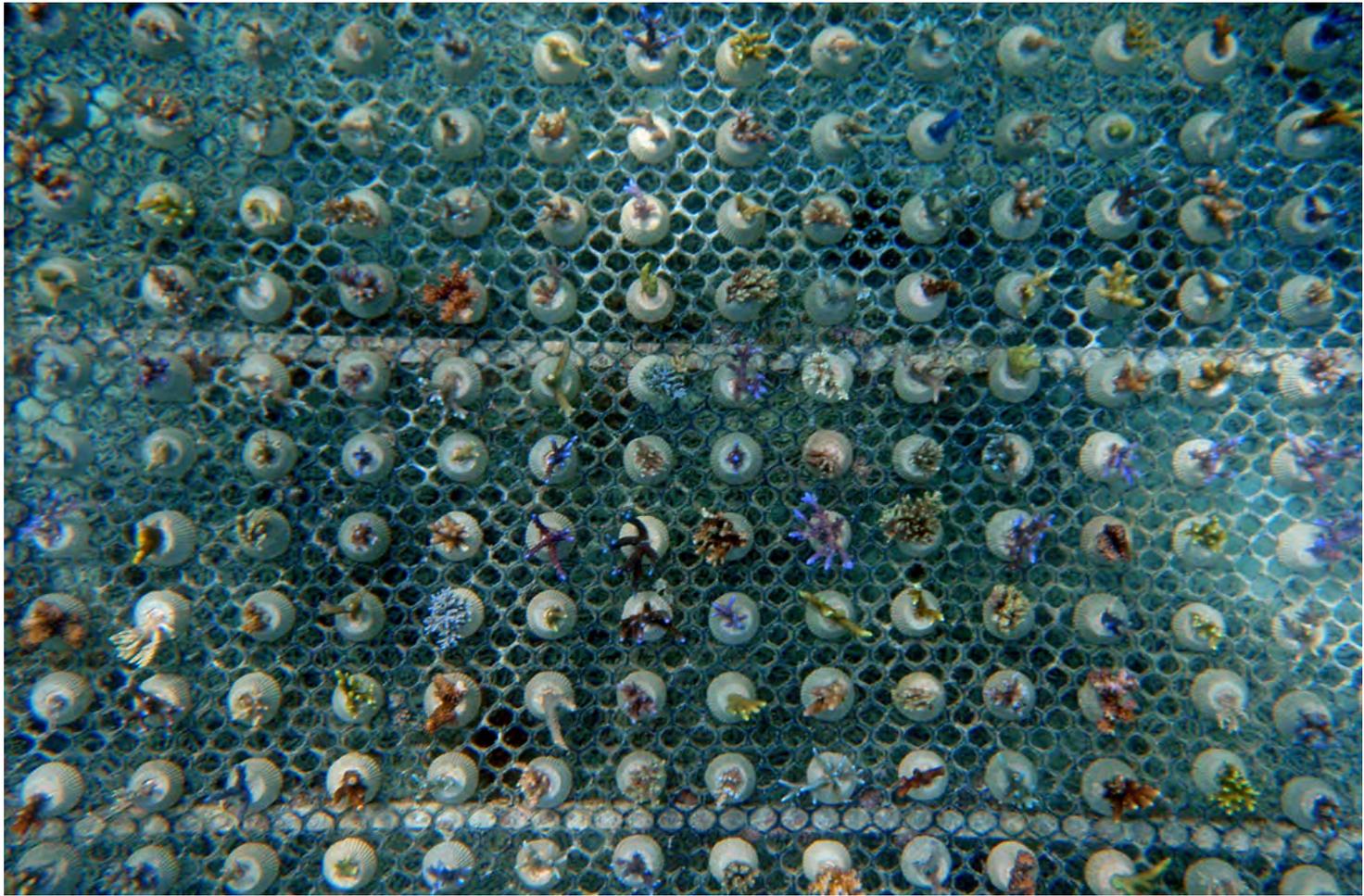






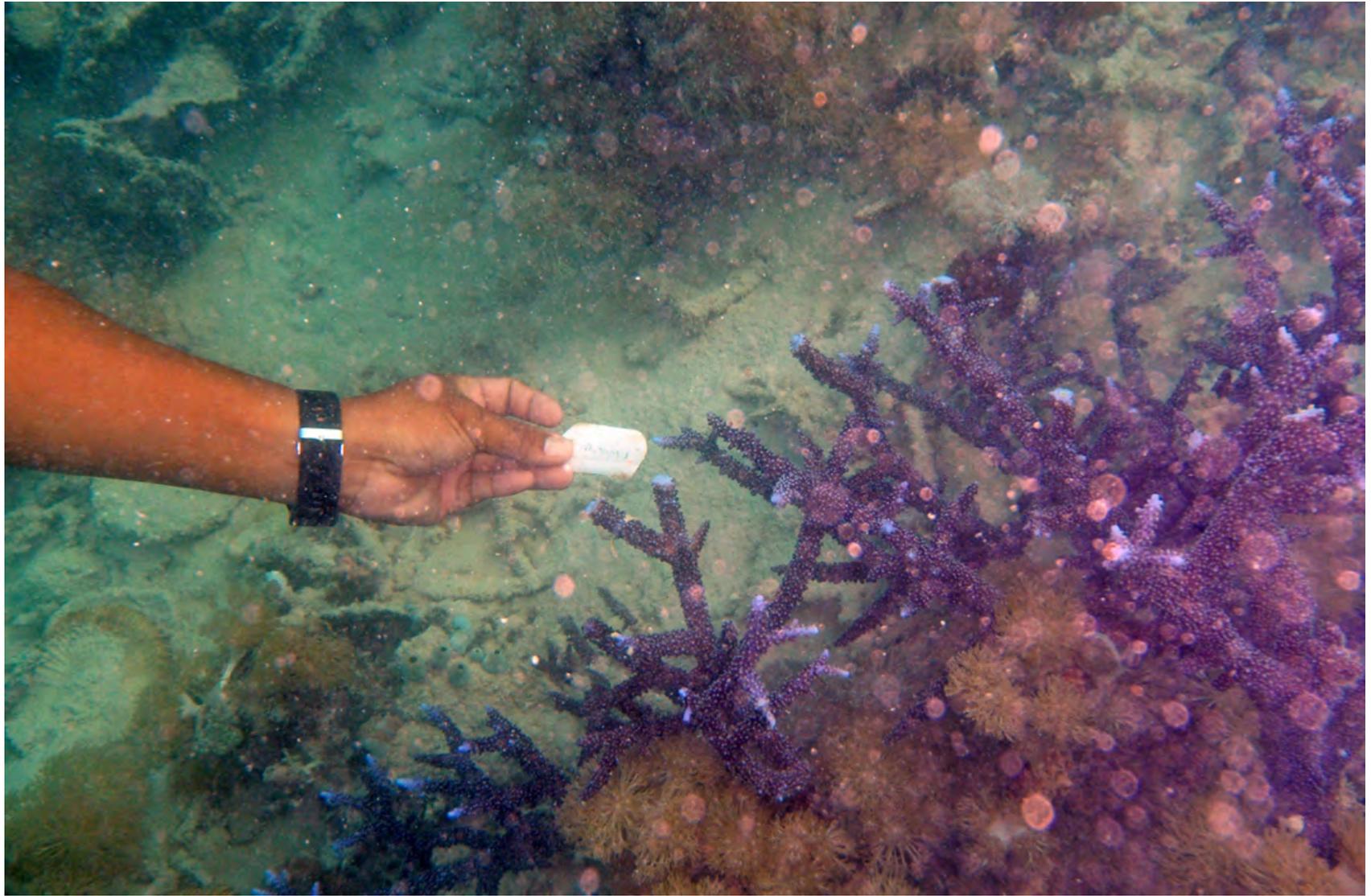




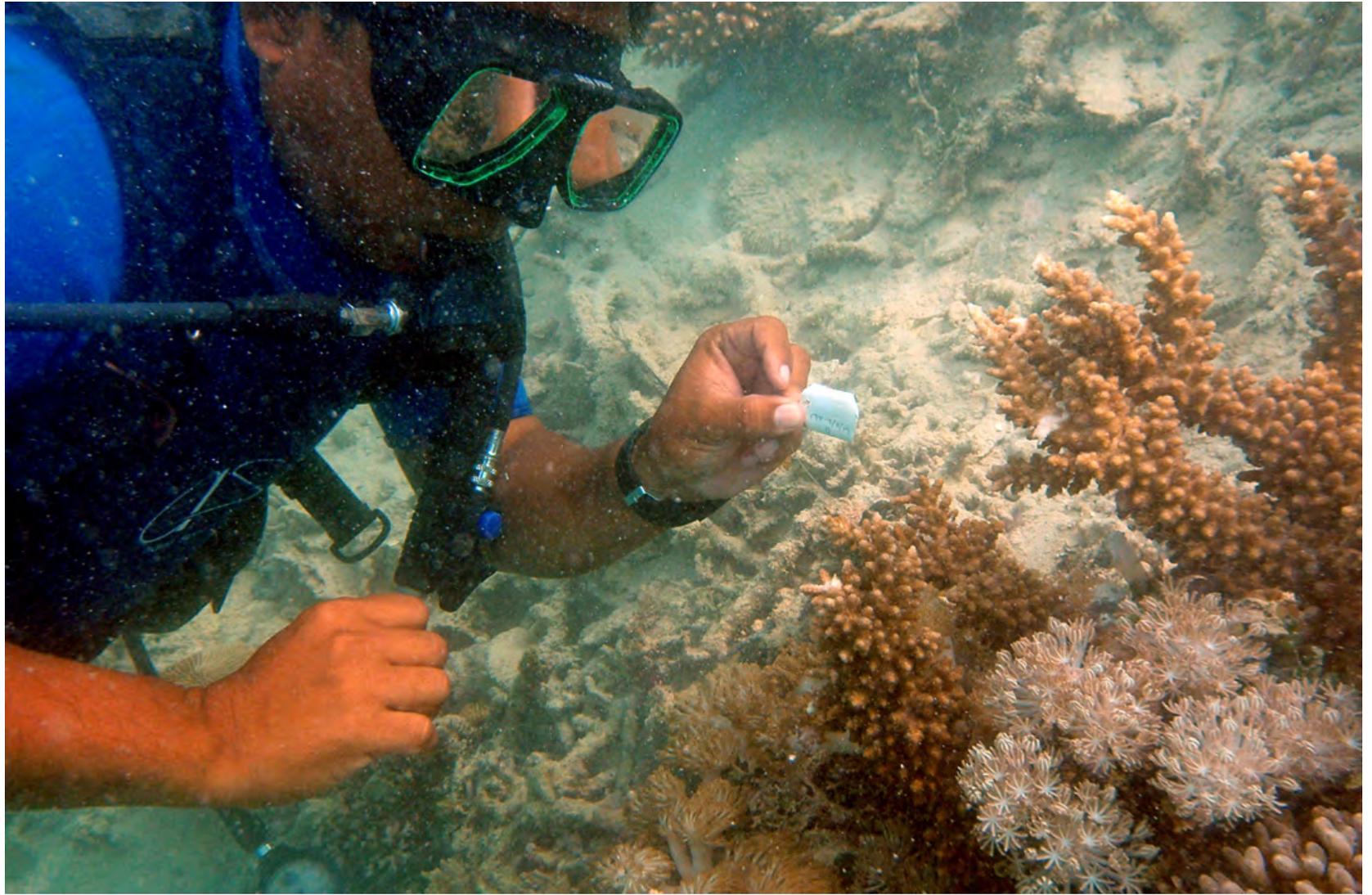






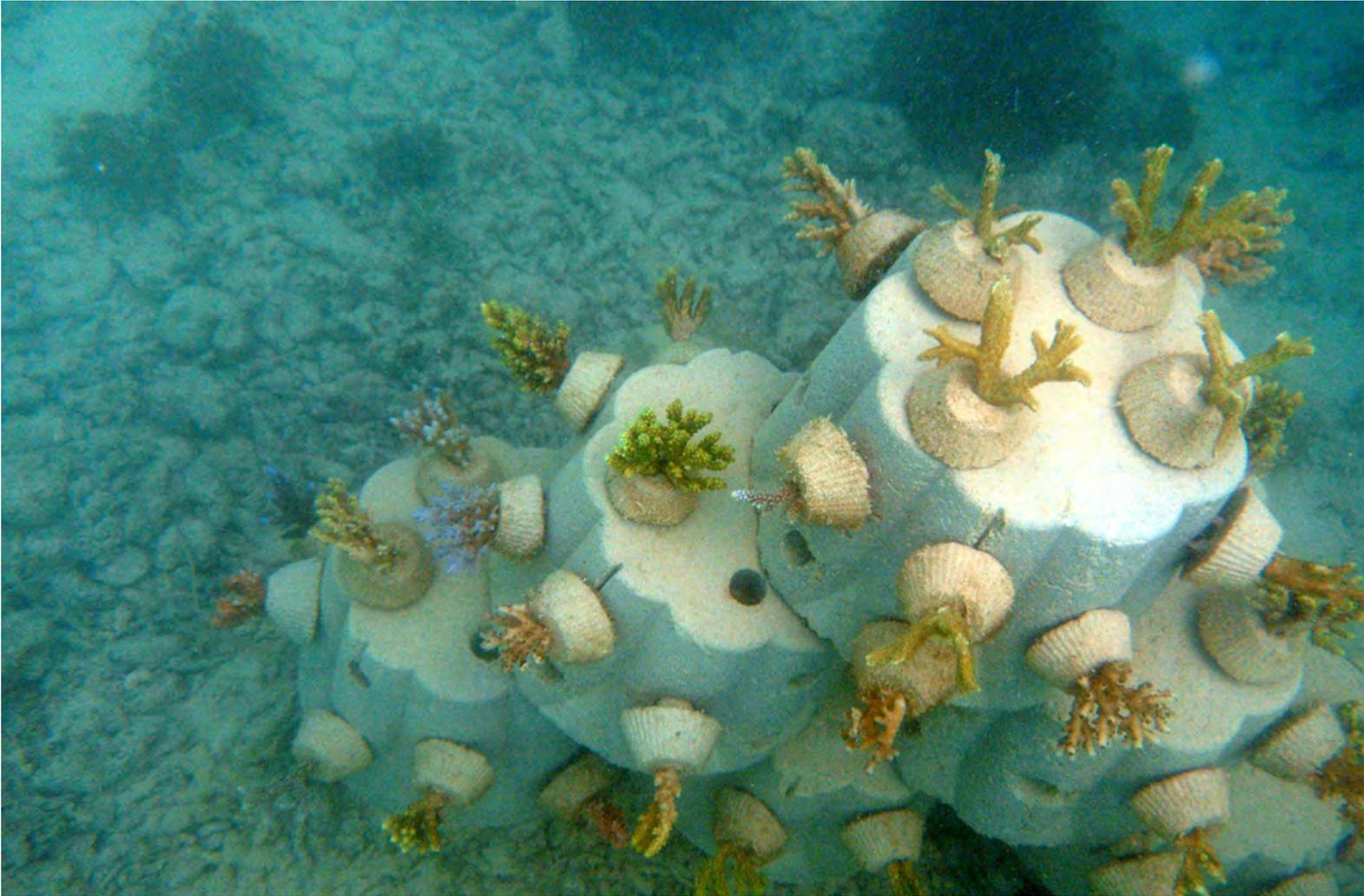


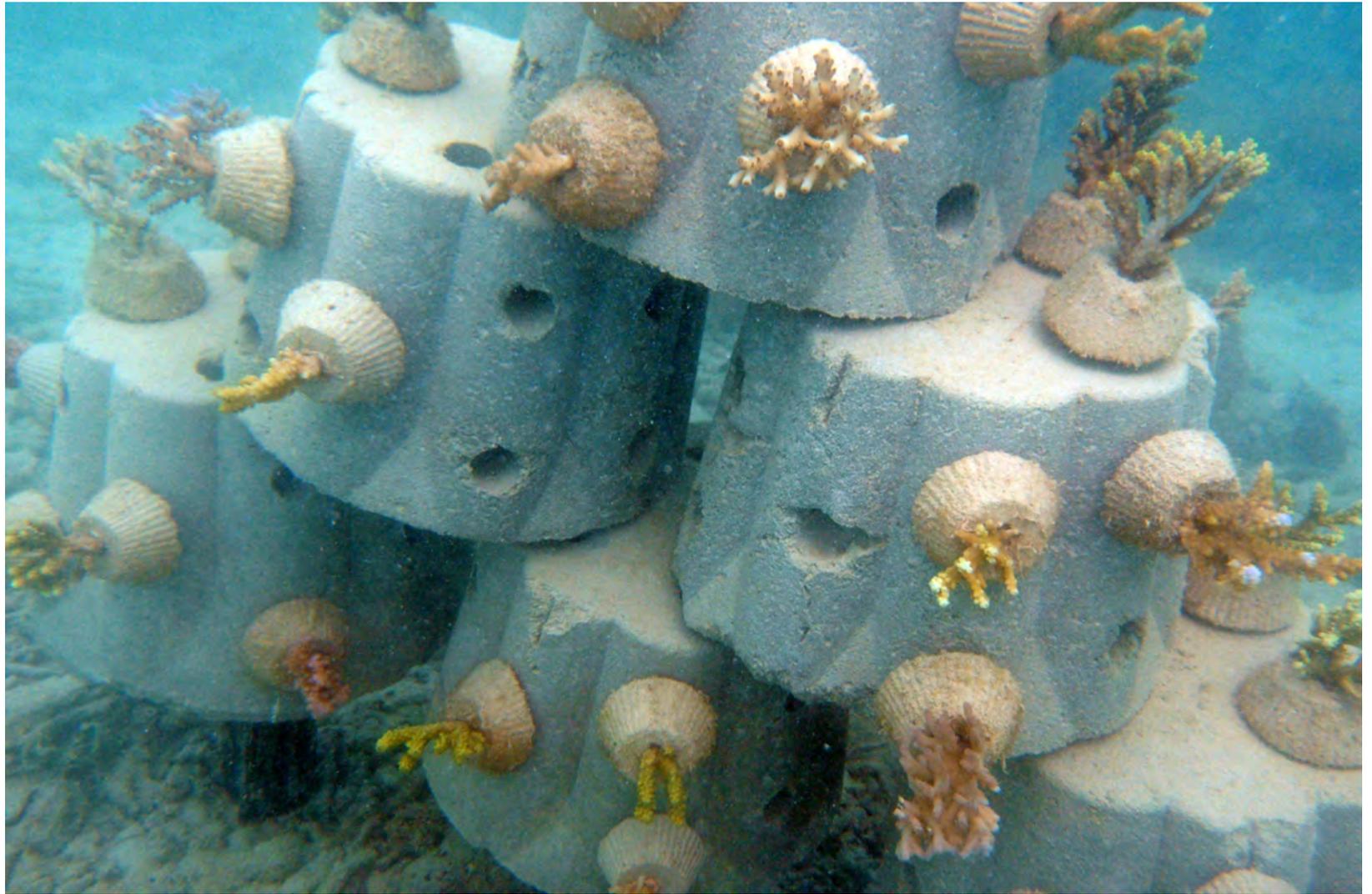
















# List of Coral

1. **Scientific Name:** *Acropora valida*

Common Name: Cluster acropora

2. **Scientific Name:** *Acropora nobilis*

Common Name: Branching blue acropora

3. **Scientific Name:** *Acropora verweyi*

Common Name: Cluster acropora

4. **Scientific Name:** *Turbinaria reniformis*

Common Name: Scroll coral

5. **Scientific Name:** *Stylophora pistillata*

Common Name: Club finger coral

6. **Scientific Name:** *Goniopora sp.*

7. **Scientific Name:** *Porites cylindrical*

8. **Scientific Name:** *Hydrophora exesa*

9. **Scientific Name:** *Merulina scabricula*

10. **Scientific Name:** *Pocillopora damicornis*

Common Name: Cauliflower coral

11. **Scientific Name:** *Sacrophyton sp.*

12. **Scientific Name:** *Sinularia flexibilis*

Common Name: Flexible leather coral

Features: long flowing arms, yellow cream

13. **Scientific Name:** *Nephthea sp.*

Common Name: Tree coral

Features: polyp clusters glazed with attractive purple hue on very beautiful white stalk

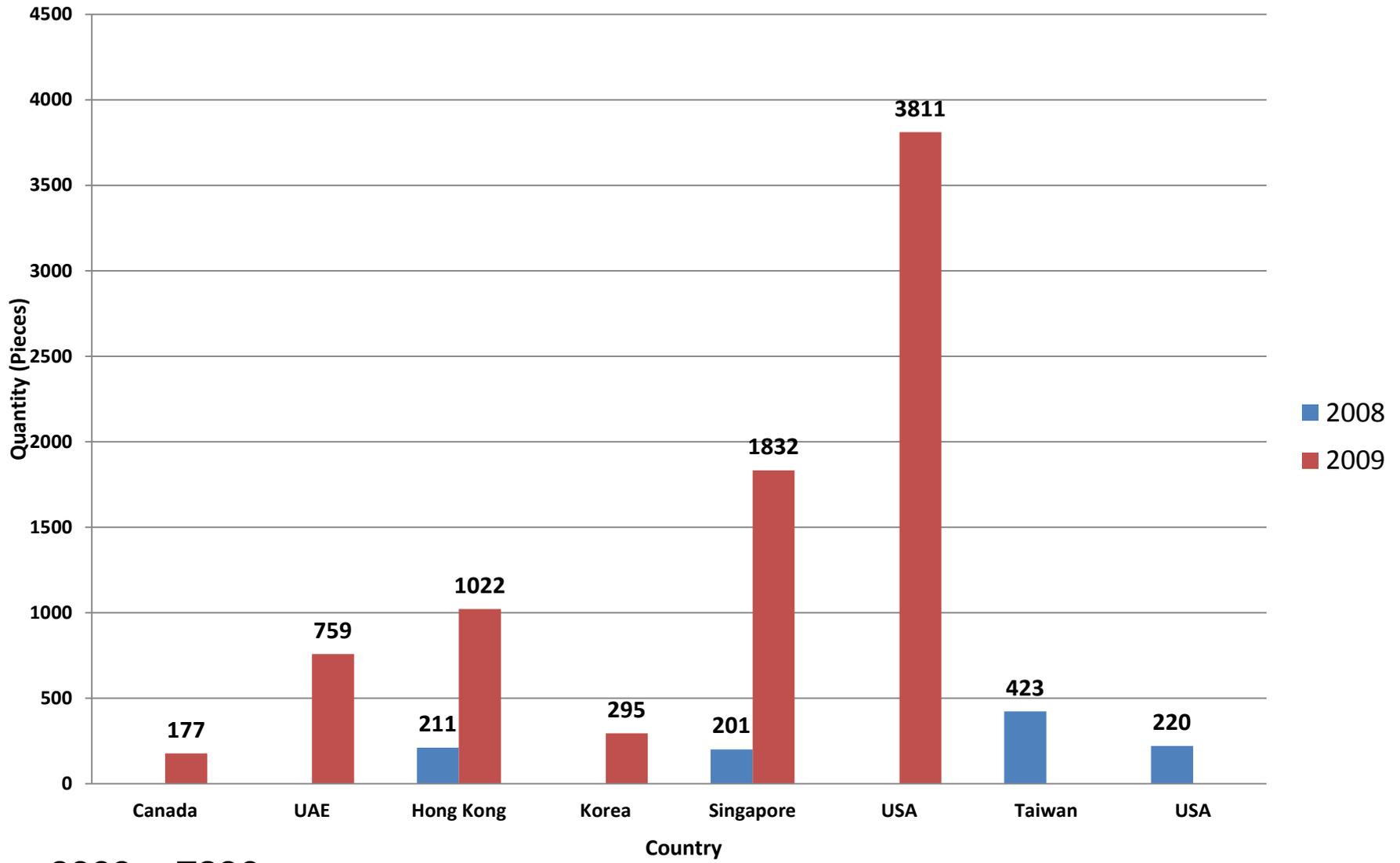
14. **Scientific Name:** *Xenia sp.*

Common Name: Pulse coral

Features: feathery pulsing polyps

<http://www.innofishcfp.com>





**Year 2009 = 7896**

**Year 2008 = 1055**

# If there is no NDF, ...

Resolution Conf. 10.3 (**Designation and role of the Scientific Authorities**), the Conference of Parties recommends that Management Authorities **NOT** issue any export or import permit, or certificate of introduction from the sea, for species listed in the Appendices .....



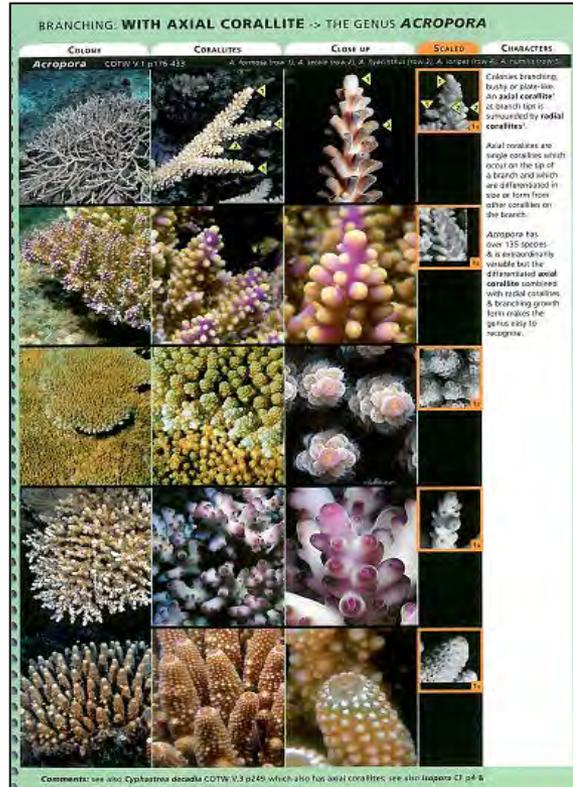
# Content of an NDF

Scientific review of available information on :

- ✓ population status;
- ✓ distribution;
- ✓ population trend;
- ✓ harvest;
- ✓ other biological and ecological factors, as appropriate;  
and
- ✓ trade information.

# Way Forward

- Marine Research & Rescue Center
- Standard of Procedure
- Guide to Indo-Pacific Corals Common in Wildlife Trade



## GUIDE TO INDO-PACIFIC CORALS COMMON IN THE WILDLIFE TRADE



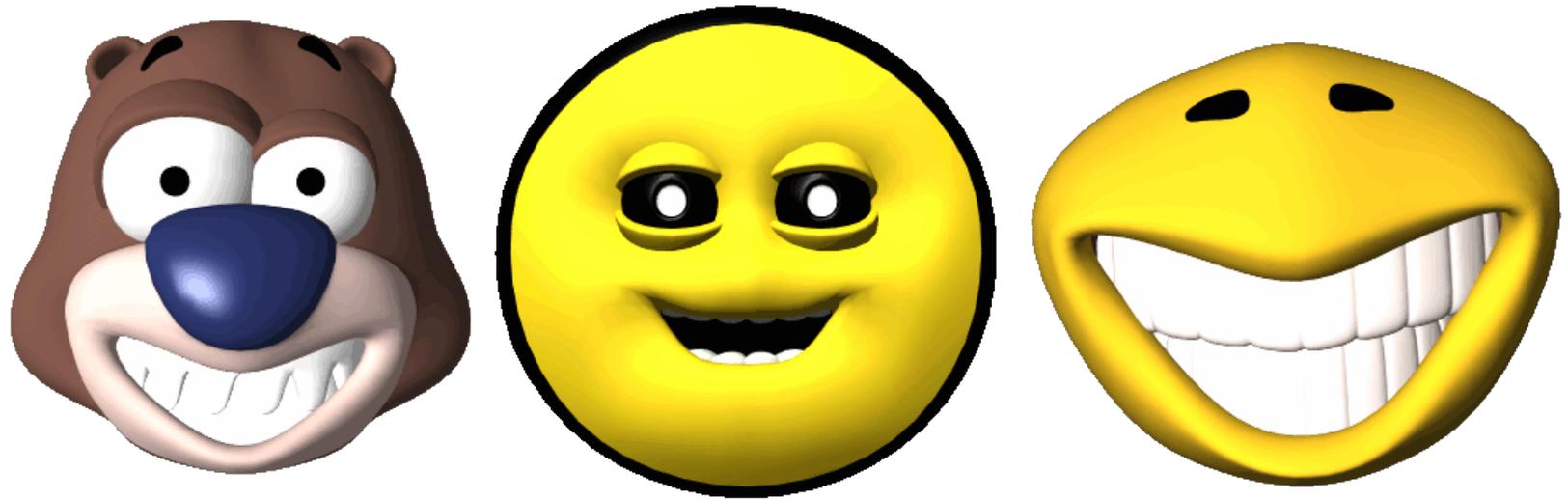
CITES Identification Manual  
Coral Indo-Pacific

By  
David Awang  
For

Department of Fisheries Malaysia  
2010



FISHERIES RESEARCH INSTITUTE



**THANK YOU**

*“Learn from yesterday, live for today, hope for tomorrow. The important thing is not to stop questioning*

*- Albert Einstein (1879 - 1955)*



# TIMOR LESTE



**Julio da Cruz**

# INTRODUCTION

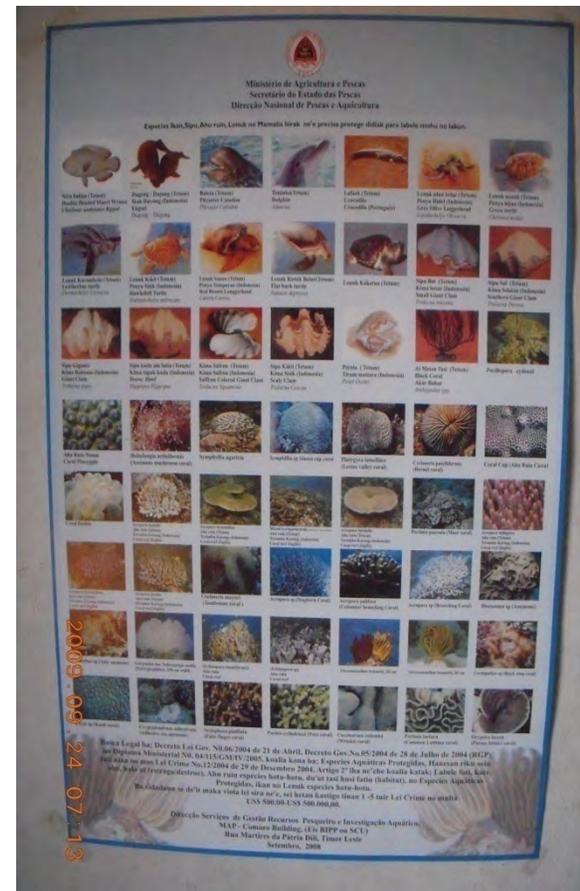
- Total population : 1.1M (2010)
- Fishing Zone (National waters) :  $\pm 65\text{km}^2$
- Coast line :  $\pm 740\text{km}$
- Total of fisher : 6360 fishers
- Total of aquaculturist : 2205 aquaculturists



# LEGAL BASE

## CORAL REEFS & OTHER AQUATIC SPECIES

- Fisheries Law and Regulation
  - Fisheries Crime No 12/2004  
*(Article 2: prohibited to move, tough, destroy coral reefs, seagrass from its habitat and all aquatic protected species)*
  - Ministerial Diploma No 04/115/GM/IV/2005  
*(Protected following species: fish; Double Headed Maori Wrasse, marine mammals, crocodiles, marine turtles, clams and all coral reefs)*



# MARICULTURE

- Mariculture
  - Seaweed
    - In 2000s started Seaweed Culture
    - In 2008 Export (dry) ±100s Tones
    - Local consumption (wet/fresh)
  - Fish
    - Fresh water (Carp & Tilapia) local consumption
    - Brackish water ( Milk Fish) local consumption
    - Marine (Not yet)



Thank You

# **PHILIPPINE LAWS ON CORALS: Prospects for Mariculture and Trade**

**Ludivina L. Labe  
Senior Marine Biologist/Wildlife Regulations Officer  
Bureau of Fisheries and Aquatic Resources  
Philippines**



# OUTLINE

- **Philippine regulations on corals:  
historical review**
- **Current legislations**
- **Implementing agencies**
- **Coral trade issues**
- **Roadmap for coral mariculture and  
trade: BFAR agenda**

# Coral regulations: historical review

- Presidential Decree (PD) No. 1219, 14 October 1977
  - gathering, harvesting, collecting and/or exporting ordinary corals (hard/stony corals) prohibited; exemption for scientific research purposes
  - exploration by concession and exportation of precious (ex. *Corallium*) and semi-precious (ex. *Antipatharia* spp.) allowed if finished products

- Semi-precious corals:



Melitheae spp.  
(red corals)



*Antipatharia* spp. (black corals)

- 
- Presidential Decree No. 1698, 22 May, 1980  
= amendment of certain sections of PD 1219
    - all forms of utilization of ordinary corals prohibited
    - exploration of precious and semi-precious coral resources given to only one concessionaire for limited period of time.



# Current legislations:

- Republic Act No. 8550 (Philippine Fisheries Code of 1998)
  - Section 91 = prohibition on gathering, possessing, selling or exporting ordinary, precious and semi-precious corals, whether in raw or processed form
  - Penalty = 6 months to 2 years imprisonment and from Php 2 – 20 thousand fine, forfeiture of catch and vessel

- 
- Fisheries Administrative Order (FAO) No. 202, Series of 2000
    - implementing rules and regulations of Section 91 of R.A. 8550
    - a special permit to research institutions to gather any coral in limited quantities for scientific or research purposes, except those coral species listed in CITES appendix



- R. A. No. 9147, 19 March 2001 and FAO No. 233 Series of 2010

- otherwise known as *Wildlife Conservation and Protection Act* and *Aquatic Wildlife Conservation Act*, respectively
- convergence of all agencies and entities to form Committees:
  1. National Aquatic Wildlife Management Council
  2. Philippine Aquatic Red List Committee
  3. CITES Management Authorities
  4. CITES Scientific Authorities
  5. Aquatic Wildlife Enforcement Officers
  6. National Aquatic Wildlife Research Centers
  7. National Aquatic Wildlife Rescue Centers
  8. Aquatic Wildlife Traffic Monitoring Units



➤ legal basis for:

- ✓ the implementation of CITES in the Philippines
- ✓ establishment of captive breeding operations for threatened, endangered and CITES-listed species, e.g. corals, for commercial purposes (Sec. 17, Article 1, Chapter III, R.A. 9147 and Sec. 23, FAO No. 233)

# LEAD IMPLEMENTING AGENCIES FOR R.A. NO. 9147

**BUREAU  
OF FISHERIES  
AND  
AQUATIC  
RESOURCES  
(BFAR)**

All aquatic organisms  
except turtles,  
porpoises and Dugong

**PROTECTED AREAS  
AND  
WILDLIFE BUREAU  
(PAWB)**

All terrestrial &  
wetland organisms,  
including turtles,  
porpoises and Dugong

**PALAWAN  
COUNCIL FOR  
SUSTAINABLE  
DEVELOPMENT  
(PCSD)**

All aquatic and  
terrestrial  
resources of the  
Province of  
Palawan

**MANAGEMENT AUTHORITIES**

**BUREAU OF FISHERIES AND  
AQUATIC RESOURCES  
(BFAR)**

**FEESD (NFRDI)**

**PHIL. NATL. MUSEUM**

**UPMSI**

**UP VISAYAS**

**SILLIMAN U.**

**PROTECTED AREAS AND  
WILDLIFE BUREAU  
(PAWB)**

**ERDB**

**PHIL. NATIONAL  
MUSEUM**

**UPLB IBS**

**SCIENTIFIC AUTHORITIES**



# Coral trade issues:

- huge stockpiles of corals in Cebu and Zamboanga warehouses claimed collected prior to PDs 1219
- appeal for moratorium on export of ordinary corals
- listing of all stony corals in CITES Appendix II (1980) and Philippine ratification of CITES (1981)
- continuous high demand and price in international market and strict national laws = large scale smuggling
- implementation of FAO No. 233 held in abeyance

# Roadmap to coral mariculture and trade: BFAR agenda

- Full implementation of Sec. 23 of FAO No. 233
- Convene the Philippine Aquatic Red List Committee (PARLC)
- Hold consultative meetings with NAWMC, PARLC and its sub-branch to be called Committee of Coral Experts (CCE) and other academic and research institutions to review the draft FAO on coral farming: Policy and Procedures on the Conduct of Culture and Trade in Coral Species.

Mariculture zones and parks are designed to produce finfishes thru seacage cultures such as bangus, siganids, groupers, red snappers, seaweeds farming, aquasilviculture, mussel culture, oyster culture, searanching of lobsters and seahorses in coral reefs and seagrass areas, and others that may be developed through the continuing research and development program of the Bureau of Fisheries and Aquatic Resources (BFAR) and other institutions.

These zones and/or parks are community-based marina type project in municipal waters with the involvement of municipal fisherfolks and their organization within the duly designated fishery areas. Mariculture parks are chosen for its diverse and productive environment suitable for commercial mariculture development; access to existing infrastructure supports, ice plants, and BFAR facilities; and accessibility to input supply and markets. [Visit the FAQs for more information.]



# Location of Existing Mariculture Park/Zone

(As of April 20, 2010)

